VES Switch

VDSL Switch

CLI Reference Guide

Versions 3.60, 3.70, 3.80
3/2010
Edition 2

DEFAULT LOGIN	
IP Address	**http://192.168.0.1 (Out-of-band MGMT port)** **http://192.168.1.1 (In-band ports)**
User Name	**admin**
Password	**1234**

ZyXEL

www.zyxel.com

About This User's Guide

Intended Audience

This manual is intended for people who want to configure the VES series via commands. You should have at least a basic knowledge of TCP/IP networking concepts and topology.

The version number on the cover page refers to the latest firmware version supported by the ZyXEL VES Switch. This guide covers the following models at the time of writing.

VES-1616FA-44	VES-1624FA-44	VES-1616FA-54	VES-1624FA-54
VES-1608FC-44	VES-1616FC-44	VES-1616CTA-54	VES-1624CTA-54
VES-1608PE-35	VES1616FT-54	VES1624FT-54	VES-1616PE-54
VES-1616CTA+	VES-1624CTA+	VES-1608FA-3x	VES-1616FB-35

This guide is intended as a command reference for a series of products. Therefore many commands in this guide may not be available in your product. See your User's Guide for a list of supported features and details about feature implementation.

Please refer to www.zyxel.com or your product's CD for product specific User Guides and product certifications.

CLI Reference Guide Feedback

Help us help you. Send all Reference Guide-related comments, questions or suggestions for improvement to the following address, or use e-mail instead. Thank you!

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Customer Support

In the event of problems that cannot be solved by using this manual, you should contact your vendor. If you cannot contact your vendor, then contact a ZyXEL office for the region in which you bought the device. See http://www.zyxel.com/web/contact_us.php for contact information. Please have the following information ready when you contact an office.

- Product model and serial number.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

Document Conventions

Warnings and Notes

These are how warnings and notes are shown in this User's Guide.

Warnings tell you about things that could harm you or your device.

Notes tell you other important information (for example, other things you may need to configure or helpful tips) or recommendations.

Syntax Conventions

This manual follows these general conventions:

- The VES series may be referred to as the "Switch", the "system", the "device", or the "product" in this Reference Guide. Differentiation between models is made where needed.
- Units of measurement may denote the "metric" value or the "scientific" value. For example, "k" for kilo may denote "1000" or "1024", "M" for mega may denote "1000000" or "1048576" and so on.

Command descriptions follow these conventions:

- Commands are in `courier new font`.
- Required input values are in angle brackets <>; for example, `ping <ip>` means that you must specify an IP address for this command.
- Optional fields are in square brackets []; for instance `show logins [name]`, the name field is optional.

  The following is an example of a required field within an optional field: `snmp-server [contact <system contact>]`, the `contact` field is optional. However, if you use `contact`, then you must provide the *`system contact`* information.
- Lists (such as *`<port-list>`*) consist of one or more elements separated by commas. Each element might be a single value (1, 2, 3, ...) or a range of values (1-2, 3-5, ...) separated by a dash.
- The | (bar) symbol means "or".
- *`italic`* terms represent user-defined input values; for example, in `snmp-server [contact <system contact>]`, *`system contact`* can be replaced by the administrator's name.
- A key stroke is denoted by square brackets and uppercase text, for example, [ENTER] means the "Enter" or "Return" key on your keyboard
- `<cr>` means press the [ENTER] key.

- An arrow (- - >) indicates that this line is a continuation of the previous line.

Icons Used in Figures

Figures in this User's Guide may use the following generic icons. The Switch icon is not an exact representation of your device.

Switch	Computer	Server
Notebook computer	DSLAM	Gateway
Central Office/ ISP	Internet	Hub/Switch

Safety Warnings

See the appropriate User's Guide for safety warnings.

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Introduction

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1 Getting Started

This chapter introduces the command line interface (CLI).

1.1 Accessing the CLI

Use any of the following methods to access the CLI.

1.1.1 Console Port

1. Connect your computer to the console port on the Switch using the appropriate cable.
2. Use terminal emulation software with the following settings:

Table 1 Default Settings for the Console Port

SETTING	DEFAULT VALUE
Terminal Emulation	VT100
Baud Rate	9600 bps
Parity	None
Number of Data Bits	8
Number of Stop Bits	1
Flow Control	None

3. Press [ENTER] to open the login screen.

1.1.2 Telnet

1. Connect your computer to the **MGMT** port.
2. Open a Telnet session to the Switch's IP address. If this is your first login, use the default values.

Table 2 Default Management IP Address

SETTING	DEFAULT VALUE
IP Address	192.168.0.1
Subnet Mask	255.255.255.0

Make sure your computer IP address is in the same subnet, unless you are accessing the Switch through one or more routers.

1.1.3 SSH

1. Connect your computer to the **MGMT** port.
2. Use a SSH client program to access the Switch. If this is your first login, use the default values in Table 2 on page 15 and Table 3 on page 16. Make sure your computer IP address is in the same subnet, unless you are accessing the Switch through one or more routers.

1.2 Logging in

Use the administrator username and password. If this is your first login, use the default values.

Table 3 Default User Name and Password

SETTING	DEFAULT VALUE
User Name	admin
Password	1234

The Switch automatically logs you out of the management interface after five minutes of inactivity. If this happens to you, simply log back in again.

1.3 Using Shortcuts and Getting Help

This table identifies some shortcuts in the CLI, as well as how to get help.

Table 4 CLI Shortcuts and Help

COMMAND / KEY(S)	DESCRIPTION
`history`	Displays a list of recently-used commands.
▲▼ `(up/down arrow keys)`	Scrolls through the list of recently-used commands. You can edit any command or press `[ENTER]` to run it again.
`[CTRL]+Z`	Returns to the previous mode. See Chapter 2 on page 19 for more information about modes.
`[CTRL]+U`	Clears the current command.
`[TAB]`	Auto-completes the keyword you are typing if possible. For example, type `config`, and press `[TAB]`. The Switch finishes the word `configure`.
`?`	Displays the keywords and/or input values that are allowed in place of the `?`.
`help`	Displays the (full) commands that are allowed in place of `help`.

The help generally follows these syntax conventions:

- Each interface refers to a port on the Switch.
- Required input values are in angle brackets <>; for example, `ping <ip-address>` means that you must specify an IP number for this command.

- Lists (such as <*port-list*>) consist of one or more elements separated by commas. Each element might be a single value (1, 2, 3, ...) or a range of values (1-2, 3-5, ...) separated by a dash. Use an asterisk (*) to indicate all possible elements.
- The | (bar) symbol means “or”.
- Optional fields are in square brackets []; for instance, in `snmp-server [contact` <*system contact*>`] [location` <*system location*>`]`, the `contact` and `location` fields are optional.
- The <cr> means press the [ENTER] key.

1.4 Saving Your Configuration

When you run a command, the Switch saves any changes to its run-time memory. The Switch loses these changes if it is turned off or loses power. Use the `write memory` command in enable mode to save the current configuration permanently to non-volatile memory.

```
sysname# write memory
```

You should save your changes after each CLI session. All unsaved configuration changes are lost once you restart the Switch.

1.5 Logging Out

Enter `logout` to log out of the CLI. You have to be in user, enable, or config mode. See Chapter 2 on page 19 for more information about modes.

2

Privilege Level and Command Mode

This chapter introduces privilege levels and the command modes that are available in the CLI.

- The privilege level determines whether or not a user can run a particular command.
- If a user can run a particular command, the user has to run it in the correct mode.

2.1 Privilege Levels

Every command has a privilege level (0-14). Users can run a command if the session's privilege level is greater than or equal to the command's privilege level. The session's privilege level initially comes from the login account's privilege level, though it is possible to change the session's privilege level after logging in.

2.1.1 Privilege Levels for Commands

The privilege level of each command is listed in the corresponding command summary table.

At the time of writing, commands have a privilege level of 0, 3, 13, or 14. The following table summarizes the types of commands at each of these privilege levels.

Table 5 Types of Commands at Different Privilege Levels

PRIVILEGE LEVEL	TYPES OF COMMANDS AT THIS PRIVILEGE LEVEL
0	Display basic system information.
3	Display configuration or status.
13	Configure features except for login accounts, login precedence, multiple logins, and administrator and enable passwords.
14	Configure login accounts, login precedence, multiple logins, and administrator and enable passwords.

2.1.2 Privilege Levels for Login Accounts

You can manage the privilege levels for login accounts the following ways:

- Use commands. Login accounts can be configured by the **admin** account or any login account with a privilege level of 14. See Chapter 35 on page 151.
- Use vendor-specific attributes in an external authentication servers. See the User's Guide for more information.

The **admin** account has a privilege level of 14, so the administrator can run every command. You cannot change the privilege level of the **admin** account.

2.1.3 Privilege Levels for Sessions

The session's privilege level initially comes from the privilege level of the login account the user used to log in to the Switch. After logging in, the user can use the following commands to change the session's privilege level.

2.1.3.1 enable

This command raises the session's privilege level to 14. It also changes the session to enable mode, if necessary. This command is available in user mode or enable mode, and users have to know the enable password.

In the following example, the login account **user0** has a privilege level of 0 but knows that the enable password is **123456**. Afterwards, the session's privilege level is 14, instead of 0, and the session changes to enable mode.

```
sysname> enable
Password: 123456
sysname#
```

The default enable password is **1234**. Use this command to set the enable password.

`password <password>`

<password> consists of 1-32 alphanumeric characters. For example, the following command sets the enable password to **123456**. See Chapter 84 on page 317 for more information about this command.

```
sysname(config)# password 123456
```

2.1.3.2 enable <0-14> Command

This command raises the session's privilege level to the specified level. It also changes the session to enable mode, if the specified level is 13 or 14. This command is available in user mode or enable mode, and users have to know the password for the specified privilege level.

In the following example, the login account **user0** has a privilege level of 0 but knows that the password for privilege level 13 is **pswd13**. Afterwards, the session's privilege level is 13, instead of 0, and the session changes to enable mode.

```
sysname> enable 13
Password: pswd13
sysname#
```

Users cannot use this command until you create passwords for specific privilege levels. Use the following command to create passwords for specific privilege levels.

`password <password> privilege <0-14>`

<password> consists of 1-32 alphanumeric characters. For example, the following command sets the password for privilege level 13 to **pswd13**. See Chapter 48 on page 179 for more information about this command.

```
sysname(config)# password pswd13 privilege 13
```

2.1.3.3 disable

This command reduces the session's privilege level to 0. It also changes the session to user mode. This command is available in enable mode.

2.2 Command Modes

The CLI is divided into several modes. If a user has enough privilege to run a particular command, the user has to run the command in the correct mode. The modes that are available depend on the session's privilege level.

2.2.1 Command Modes for Privilege Levels 0-12

If the session's privilege level is 0-12, the user and all of the commands are in user mode. Users do not have to change modes to run any allowed commands.

2.2.2 Command Modes for Privilege Levels 13-14

If the session's privilege level is 13-14, the allowed commands are in one of several modes.

Table 6 Command Modes for Privilege Levels 13-14 and the Types of Commands in Each One

MODE	PROMPT	TYPES OF COMMANDS IN THIS MODE
enable	`sysname#`	Displays current configuration, diagnostics, maintenance.
config	`sysname(config)#`	Configures features other than those below.
config-interface	`sysname(config-interface)#`	Configures ports.
config-mvr	`sysname(config-mvr)#`	Configures multicast VLAN.
config-port	`sysname(config-port)#`	Configures VLAN port isolation.
config-RmtVtur	`sysname(config-RmtVtur)#`	Configures remote (CPE) devices.
config-vdsl-alarmprofile	`sysname(config-vdslalarmprofile)#`	Configures VDSL alarm profiles.
config-vdsl-profile	`sysname(config-vdslprofile)#`	Configures VDSL profiles.
config-vlan	`sysname(config-vlan)#`	Configures static VLAN.

Each command is usually in one and only one mode. If a user wants to run a particular command, the user has to change to the appropriate mode. The command modes are organized like a tree, and users start at the root of the tree in enable mode. The following table explains how to change from one mode to another.

Table 7 Changing Between Command Modes for Privilege Levels 13-14

MODE	ENTER MODE	LEAVE MODE
enable	`--`	`--`
config	`configure`	`exit`
config-interface	`interface port-channel <port-list>`	`exit`
config-mvr	`mvr <vlan-id>`	`exit`
config-port	`vlan1q port-isolation <port-list>`	`exit`
config-vdsl-alarmprofile	`vdsl-alarmprofile <profile-name>`	`exit`
config-vdsl-profile	`vdsl-profile <profile-name>`	`exit`
config-vlan	`vlan <vlan-id>`	`exit`
config-RmtVtur	`rmt-vtur port-channel <port-list>`	`exit`

3

Initial Setup

This chapter identifies tasks you might want to do when you first configure the Switch.

3.1 Changing the Administrator Password

It is recommended you change the default administrator password.

Use this command to change the administrator password.

`admin-password <password> <confirm-password>`

where <*password*> and <*confirm-password*> may be 1-32 alphanumeric characters long.

```
sysname# configure
sysname(config)# admin-password t1g2y7i9 t1g2y7i9
```

3.2 Changing the Enable Password

It is recommended you change the default enable password.

Use this command to change the enable password.

`password <password>`

where <*password*> may be 1-32 alphanumeric characters long.

```
sysname# configure
sysname(config)# password k8s8s3dl0
```

3.3 Prohibiting Concurrent Logins

By default, multiple CLI sessions are allowed via the console port or Telnet. See the User's Guide for the maximum number of concurrent sessions for your Switch. Use this command to prohibit concurrent logins.

```
no multi-login
```

Console port has higher priority than Telnet. See Chapter 46 on page 175 for more `multi-login` commands.

```
sysname# configure
sysname(config)# no multi-login
```

3.4 Changing the Management IP Address

Use this command to change the management IP address when you are connected to the **MGMT** port.

```
ip address <ip-address> <mask>
```

or

```
ip outband address <ip-address> <mask>
```

This example shows you how to change the out-of-band management IP address to 172.1.1.10 with subnet mask 255.255.255.0.

```
sysname# configure
sysname(config)# ip address 172.1.1.10 255.255.255.0
```

or

```
sysname# configure
sysname(config)# ip outband address 172.1.1.10 255.255.255.0
```

Afterwards, you have to use the new IP address to access the Switch.

Use this command to change the management IP address when you are connected to any other ports.

```
vlan <vlan-id> ip address inband-default <ip-address> <mask>
```

or

```
ip inband address <ip-address> <mask>
```

Alternatively, use this command if you want the Switch can get the in-band management IP address from a DHCP server.

```
vlan <vlan-id> ip address inband-default dhcp-bootp
```

or

```
ip inband client
```

3.5 Looking at Basic System Information

Use this command to look at general system information about the Switch.

```
show system-information
```

This is illustrated in the following example.

```
sysname# show system-information

System Name             : VES-1616FA-54
System Contact          :
System Location         :
Ethernet Address        : 00:19:cb:00:00:02
ZyNOS F/W Version       : V3.50(AYG.2)b4 | 03/13/2008
RomRasSize              : 3581028
System up Time          :     0:16:44 (18869 ticks)
Bootbase Version        : V0.2 | 06/08/2007
Power info              : N/A
Product Model           : VES-1616FA-54
```

See Chapter 84 on page 317 for more information about these attributes.

3.6 Looking at the Operating Configuration

Use this command to look at the current operating configuration.

```
show running-config
```

This is illustrated in the following example.

```
sysname# show running-config
Building configuration...

Current configuration:

vlan 1
name 1
normal ""
fixed 1-18
forbidden ""
untagged 1-18
exit
interface port-channel 1
igmp-querier-mode edge
broadcast-limit 262143
exit
--------------------------------- SNIP --------------------------------
```

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4

How to Use This Guide

This chapter explains how commands are introduced in this guide.

4.1 Background Information (Optional)

See the User's Guide for background information about most features.

This section provides background information about features that you cannot configure in the Web Configurator. In addition, this section identifies related commands in other chapters.

4.2 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 8 Example: User-input Values

COMMAND	DESCRIPTION
vlan-id	1~4094

This section lists the commands for this feature in one or more tables.

Table 9 Example: Command Summary Table

COMMAND	DESCRIPTION	M	P
`show vlan`	Displays the status of all VLANs.	E	3
`vlan <vlan-id>`	Enters config-vlan mode for the specified VLAN. Creates the VLAN, if necessary.	C	13
`inactive`	Disables the specified VLAN.	C	13
`no inactive`	Enables the specified VLAN.	C	13
`no vlan <vlan-id>`	Deletes a VLAN.	C	13

The **Table** title identifies the specific keyword(s) that the commands share.

The **Command** column shows the syntax of the command. The syntax follows the same conventions the help (Section 1.3 on page 16) does, in addition to the following.

- *these* terms represent user-input values that are explained in more detail in the **Description** column or in the user-input value table.
- If a command is indented, users have to run it in one of the config- modes. You can identify the specific mode by looking at the last config-mode command above it.
- If a command is not indented, users have to run it in enable or config mode.

The **Description** column explains what the command does. It also identifies legal input values for user-input values, if necessary.

The **M** column helps identify the mode in which users have to run the command.

- **E**: The command is available in enable mode. It is also available in user mode if the privilege level (**P**) is less than 13.
- **C**: The command is available in config (not indented) or one of the config- (indented) modes.

The **P** column identifies the privilege level of the command.

4.3 Command Examples (Optional)

This section contains any examples for the commands in this feature.

5

AAA Commands

Use these commands to configure authentication, authorization and accounting on the Switch.

5.1 Command Summary

The following section lists the commands for this feature.

Table 10 aaa authentication Command Summary

COMMAND	DESCRIPTION	M	P
`show aaa authentication`	Displays what methods are used for authentication.	E	13
`show aaa authentication enable`	Displays the authentication method(s) for checking privilege level of administrators.	E	13
`aaa authentication enable <method1> [<method2> ...]`	Specifies which method should be used first, second, and third for checking users' privileges for settings. *method*: `local`, `radius`, or `tacacs+`.	C	13
`no aaa authentication enable`	Resets the method list for checking privileges to its default value.	C	13
`show aaa authentication login`	Displays the authentication methods for administrator login accounts.	E	13
`aaa authentication login <method1> [<method2> ...]`	Specifies which method should be used first, second, and third for the authentication of login accounts. This is used to determine a user can log into the Switch or not. *method*: `local`, `radius`, or `tacacs+`.	C	13
`no aaa authentication login`	Resets the method list for the authentication of login accounts to its default value.	C	13

Table 11 aaa accounting Command Summary

COMMAND	DESCRIPTION	M	P
`show aaa accounting`	Displays accounting settings configured on the Switch.	E	3
`show aaa accounting update`	Display the update period setting on the Switch for accounting sessions.	E	3
`aaa accounting update periodic <1-2147483647>`	Sets the update period (in minutes) for accounting sessions. This is the time the Switch waits to send an update to an accounting server after a session starts.	C	13
`no aaa accounting update`	Resets the accounting update interval to the default value.	C	13
`show aaa accounting commands`	Displays accounting settings for recording command events.	E	3

Table 11 aaa accounting Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`aaa accounting commands <privilege> stop-only tacacs+ [broadcast]`	Enables accounting of command sessions and specifies the minimum privilege level (0-14) for the command sessions that should be recorded. Optionally, sends accounting information for command sessions to all configured accounting servers at the same time.	C	13
`no aaa accounting commands`	Disables accounting of command sessions on the Switch.	C	13
`show aaa accounting dot1x`	Displays accounting settings for recording IEEE 802.1x session events.	E	3
`aaa accounting dot1x <start-stop|stop-only> <radius|tacacs+> [broadcast]`	Enables accounting of IEEE 802.1x authentication sessions and specifies the mode and protocol method. Optionally, sends accounting information for IEEE 802.1x authentication sessions to all configured accounting servers at the same time.	C	13
`no aaa accounting dot1x`	Disables accounting of IEEE 802.1x authentication sessions on the Switch.	C	13
`show aaa accounting exec`	Displays accounting settings for recording administrative sessions via SSH, Telnet or the console port.	E	3
`aaa accounting exec <start-stop|stop-only> <radius|tacacs+> [broadcast]`	Enables accounting of administrative sessions via SSH, Telnet and console port and specifies the mode and protocol method. Optionally, sends accounting information for administrative sessions via SSH, Telnet and console port to all configured accounting servers at the same time.	C	13
`no aaa accounting exec`	Disables accounting of administrative sessions via SSH, Telnet or console on the Switch.	C	13
`show aaa accounting system`	Displays accounting settings for recording system events, for example system shut down, start up, accounting enabled or accounting disabled.	E	3
`aaa accounting system <radius|tacacs+> [broadcast]`	Enables accounting of system events and specifies the protocol method. Optionally, sends accounting information for system events to all configured accounting servers at the same time.	C	13
`no aaa accounting system`	Disables accounting of system events on the Switch.	C	13

5.2 Command Examples

This example displays how to show the current authentication method settings.

```
sysname# show aaa authentication
Authentication:
        Type    Method 1        Method 2        Method 3
        Enable     local               -               -
        Login      local               -               -
```

This example displays how to sets the authentication methods first to use radius server and second to use the Switch's local database.

```
sysname# configure
sysname(config)# aaa authentication enable radius local
sysname(config)# aaa authentication login radius local
sysname(config)# exit
sysname# show aaa authentication
Authentication:
        Type    Method 1        Method 2        Method 3
        Enable    radius           local               -
        Login     radius           local               -
sysname#
```

6

ARP Commands

Use these commands to look at IP-to-MAC address mapping(s).

6.1 Command Summary

The following section lists the commands for this feature.

Table 12 arp Command Summary

COMMAND	DESCRIPTION	M	P
`show ip arp`	Displays the ARP table.	E	13
`no arp`	Flushes the ARP table entries.	E	13

6.2 Command Examples

This example shows the ARP table.

```
sysname# show ip arp
  Index   IP               MAC                VLAN  Age(s)  Type
     1    172.16.10.254    00:04:80:9b:78:00     1   300    dynamic
```

The following table describes the labels in this screen.

Table 13 show ip arp

LABEL	DESCRIPTION
Index	This field displays the index number.
IP	This field displays the learned IP address of the device.
MAC	This field displays the MAC address of the device.
VLAN	This field displays the VLAN to which the device belongs.
Age(s)	This field displays how long the entry remains valid.
Type	This field displays how the entry was learned. **dynamic**: The Switch learned this entry from ARP packets.

7

ARP Inspection Commands

Use these commands to filter unauthorized ARP packets in your network.

7.1 Command Summary

The following section lists the commands for this feature.

Table 14 arp inspection Command Summary

COMMAND	DESCRIPTION	M	P
`show arp inspection`	Displays ARP inspection configuration details.	E	3
`arp inspection`	Enables ARP inspection on the Switch. You still have to enable ARP inspection on specific VLAN and specify trusted ports.	C	13
`no arp inspection`	Disables ARP inspection on the Switch.	C	13
`clear arp inspection statistics`	Removes all ARP inspection statistics on the Switch.	E	3
`clear arp inspection statistics vlan <vlan-list>`	Removes ARP inspection statistics for the specified VLAN(s).	E	3
`show arp inspection statistics`	Displays all ARP inspection statistics on the Switch.	E	3
`show arp inspection statistics vlan <vlan-list>`	Displays ARP inspection statistics for the specified VLAN(s).	E	3

Table 15 Command Summary: arp inspection filter

COMMAND	DESCRIPTION	M	P
`show arp inspection filter [<mac-addr>] [vlan <vlan-id>]`	Displays the current list of MAC address filters that were created because the Switch identified an unauthorized ARP packet. Optionally, lists MAC address filters based on the MAC address or VLAN ID in the filter.	E	3
`no arp inspection filter <mac-addr> vlan <vlan-id>`	Specifies the ARP inspection record you want to delete from the Switch. The ARP inspection record is identified by the MAC address and VLAN ID pair.	E	13
`clear arp inspection filter`	Delete all ARP inspection filters from the Switch.	E	13
`arp inspection filter-aging-time <1-2147483647>`	Specifies how long (1-2147483647 seconds) MAC address filters remain in the Switch after the Switch identifies an unauthorized ARP packet. The Switch automatically deletes the MAC address filter afterwards.	C	13
`arp inspection filter-aging-time none`	Specifies the MAC address filter to be permanent.	C	13
`no arp inspection filter-aging-time`	Resets how long (1-2147483647 seconds) the MAC address filter remains in the Switch after the Switch identifies an unauthorized ARP packet to the default value.	C	13

Table 16 Command Summary: arp inspection log

COMMAND	DESCRIPTION	M	P
`show arp inspection log`	Displays the log settings configured on the Switch. It also displays the log entries recorded on the Switch.	E	3
`clear arp inspection log`	Delete all ARP inspection log entries from the Switch.	E	13
`arp inspection log-buffer entries <0-1024>`	Specifies the maximum number (1-1024) of log messages that can be generated by ARP packets and not sent to the syslog server. If the number of log messages in the Switch exceeds this number, the Switch stops recording log messages and simply starts counting the number of entries that were dropped due to unavailable buffer.	C	13
`arp inspection log-buffer logs <0-1024> interval <0-86400>`	Specifies the number of syslog messages that can be sent to the syslog server in one batch and how often (1-86400 seconds) the Switch sends a batch of syslog messages to the syslog server.	C	13
`no arp inspection log-buffer entries`	Resets the maximum number (1-1024) of log messages that can be generated by ARP packets and not sent to the syslog server to the default value.	C	13
`no arp inspection log-buffer logs`	Resets the maximum number of syslog messages the Switch can send to the syslog server in one batch to the default value.	C	13

Table 17 Command Summary: interface arp inspection

COMMAND	DESCRIPTION	M	P
`show arp inspection interface port-channel <port-list>`	Displays the ARP inspection settings for the specified port(s).	E	3
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`arp inspection trust`	Sets the port to be a trusted port for arp inspection. The Switch does not discard ARP packets on trusted ports for any reason.	C	13
`no arp inspection trust`	Disables this port from being a trusted port for ARP inspection.	C	13
`arp inspection limit rate <pps> [burst interval <seconds>]`	Sets a rate limit (in pps, packets per second) for ARP packets on the port. You can also set the burst interval (in seconds) over which the rate of ARP packets is monitored.	C	13
`no arp inspection limit`	Disables the rate limit for ARP packets.	C	13

Table 18 Command Summary: arp inspection vlan

COMMAND	DESCRIPTION	M	P
`show arp inspection vlan <vlan-list>`	Displays ARP inspection settings for the specified VLAN(s).	E	3
`arp inspection vlan <vlan-list>`	Enables ARP inspection on the specified VLAN(s).	C	13
`no arp inspection vlan <vlan-list>`	Disables ARP inspection on the specified VLAN(s).	C	13
`arp inspection vlan <vlan-list> logging [all|none|permit|deny]`	Enables logging of ARP inspection events on the specified VLAN(s). Optionally specifies which types of events to log.	C	13
`no arp inspection vlan <vlan-list> logging`	Disables logging of messages generated by ARP inspection for the specified VLAN(s).	C	13

7.2 Command Examples

This example looks at the current list of MAC address filters that were created because the Switch identified an unauthorized ARP packet. When the Switch identifies an unauthorized ARP packet, it automatically creates a MAC address filter to block traffic from the source MAC address and source VLAN ID of the unauthorized ARP packet.

```
sysname# show arp inspection filter
  Filtering aging timeout : 300

         MacAddress  VLAN   Port  Expiry (sec)          Reason
  -----------------  ----  -----  ------------  --------------
  Total number of bindings: 0
```

The following table describes the labels in this screen.

Table 19 show arp inspection filter

LABEL	DESCRIPTION
Filtering aging timeout	This field displays how long the MAC address filters remain in the Switch after the Switch identifies an unauthorized ARP packet. The Switch automatically deletes the MAC address filter afterwards.
MacAddress	This field displays the source MAC address in the MAC address filter.
VLAN	This field displays the source VLAN ID in the MAC address filter.
Port	This field displays the source port of the discarded ARP packet.
Expiry (sec)	This field displays how long (in seconds) the MAC address filter remains in the Switch. You can also delete the record manually (**Delete**).
Reason	This field displays the reason the ARP packet was discarded. **MAC+VLAN**: The MAC address and VLAN ID were not in the binding table. **IP**: The MAC address and VLAN ID were in the binding table, but the IP address was not valid. **Port**: The MAC address, VLAN ID, and IP address were in the binding table, but the port number was not valid.

This example looks at log messages that were generated by ARP packets and that have not been sent to the syslog server yet.

```
sysname# show arp inspection log
  Total Log Buffer Size : 32
  Syslog rate : 5 entries per 1 seconds

  Port  Vlan         Sender MAC        Sender IP  Pkts      Reason
         Time
  ----  ----  -----------------  ---------------  ----  ----------  ----
--------------------
  Total number of logs: 0
```

The following table describes the labels in this screen.

Table 20 show arp inspection log

LABEL	DESCRIPTION
Total Log Buffer Size	This field displays the maximum number (1-1024) of log messages that were generated by ARP packets and have not been sent to the syslog server yet. If the number of log messages in the Switch exceeds this number, the Switch stops recording log messages and simply starts counting the number of entries that were dropped due to unavailable buffer.
Syslog rate	This field displays the maximum number of syslog messages the Switch can send to the syslog server in one batch. This number is expressed as a rate because the batch frequency is determined by the **Log Interval**.
Port	This field displays the source port of the ARP packet.
Vlan	This field displays the source VLAN ID of the ARP packet.
Sender MAC	This field displays the source MAC address of the ARP packet.
Sender IP	This field displays the source IP address of the ARP packet.
Pkts	This field displays the number of ARP packets that were consolidated into this log message. The Switch consolidates identical log messages generated by ARP packets in the log consolidation interval into one log message.
Reason	This field displays the reason the log message was generated. **static deny**: An ARP packet was discarded because it violated a static binding with the same MAC address and VLAN ID. **deny**: An ARP packet was discarded because there were no bindings with the same MAC address and VLAN ID. **static permit**: An ARP packet was forwarded because it matched a static binding.
Time	This field displays when the log message was generated.
Total number of logs	This field displays the number of log messages that were generated by ARP packets and that have not been sent to the syslog server yet. If one or more log messages are dropped due to unavailable buffer, there is an entry called **overflow** with the current number of dropped log messages.

This example displays whether ports are trusted or untrusted ports for ARP inspection.

```
sysname# show arp inspection interface port-channel 1
Interface  Trusted State  Rate (pps)  Burst Interval
---------  -------------  ----------  --------------
        1      Untrusted          15               1
```

The following table describes the labels in this screen.

Table 21 show arp inspection interface port-channel

LABEL	DESCRIPTION
Interface	This field displays the port number. If you configure the ***** port, the settings are applied to all of the ports.
Trusted State	This field displays whether this port is a trusted port (**Trusted**) or an untrusted port (**Untrusted**). Trusted ports are connected to DHCP servers or other switches, and the switch discards DHCP packets from trusted ports only if the rate at which DHCP packets arrive is too high.

Table 21 show arp inspection interface port-channel (continued)

LABEL	DESCRIPTION
Rate (pps)	This field displays the maximum number for DHCP packets that the switch receives from each port each second. The switch discards any additional DHCP packets.
Burst Interval	This field displays the length of time over which the rate of ARP packets is monitored for each port. For example, if the Rate is 15 pps and the burst interval is 1 second, then the switch accepts a maximum of 15 ARP packets in every one-second interval. If the burst interval is 5 seconds, then the switch accepts a maximum of 75 ARP packets in every five-second interval.

8

Bandwidth Commands

Use these commands to configure the maximum allowable bandwidth for incoming or outgoing traffic flows on a port.

8.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 22 bandwidth-control and bandwidth-limit User-input Values

COMMAND	DESCRIPTION
rate	0~1000000 or 1000~1000000 Kbps.
port-list	Enter one or more port number(s). Use dash or comma to specify multiple port numbers. For example, “1~10“ means from port 1 to port 10. “1,10“ means port 1 and port 10.

The following section lists the commands for this feature.

Table 23 bandwidth-control and bandwidth-limit Command Summary

COMMAND	DESCRIPTION	M	P
`show interfaces config <port-list> bandwidth-control`	Displays the current settings for interface bandwidth control.	E	13
`bandwidth-control`	Enables bandwidth control on the Switch.	C	13
`no bandwidth-control`	Disables bandwidth control on the Switch.	C	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`bandwidth-limit`	Enables bandwidth limits on the port(s).	C	13
`no bandwidth-limit`	Disables bandwidth limits on the port(s).	C	13
`bandwidth-limit cir <rate>`	Sets the Committed Information Rate (CIR) which is the guaranteed bandwidth for the incoming traffic flow on a port.	C	13
`bandwidth-limit ingress <rate>`	Sets the maximum bandwidth in kbps allowed for incoming traffic on the port(s).	C	13

Table 23 bandwidth-control and bandwidth-limit Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`bandwidth-limit egress <rate>`	Sets the maximum bandwidth in kbps allowed for outgoing traffic on the port(s).	C	13
`bandwidth-limit pir <rate>`	Sets the Peak Information Rate (PIR) in kbps which is the maximum bandwidth allowed for the incoming traffic flow on a port when there is no network congestion. The CIR and PIR should be set for all ports that use the same uplink bandwidth. If the CIR is reached, packets are sent at the rate up to the PIR. When network congestion occurs, packets through the ingress port exceeding the CIR will be marked for drop. Note: The CIR should be less than the PIR. Note: The sum of CIRs cannot be greater than or equal to the uplink bandwidth.	C	13

8.2 Command Examples

This example sets the outgoing traffic bandwidth limit to 5000 Kbps and the incoming traffic bandwidth limit to 4000 Kbps for port 1.

```
sysname# configure
sysname(config)# bandwidth-control
sysname(config)# interface port-channel 1
sysname(config-interface)# bandwidth-limit
sysname(config-interface)# bandwidth-limit egress 5000
sysname(config-interface)# bandwidth-limit ingress 4000
sysname(config-interface)# exit
sysname(config)# exit
```

This example deactivates the bandwidth limits on port 1.

```
sysname# configure
sysname(config)# interface port-channel 1
sysname(config-interface)# no bandwidth-limit
sysname(config-interface)# exit
sysname(config)# exit
```

9

Broadcast Storm Commands

Use these commands to limit the number of broadcast, multicast and destination lookup failure (DLF) packets the Switch receives per second on the ports.

9.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 24 storm-control, bmstorm-control, and limit User-input Values

COMMAND	DESCRIPTION
pkt/s	0~148800 or 0~262143

The following section lists the commands for this feature.

Table 25 storm-control, bmstorm-control, and limit Command Summary

COMMAND	DESCRIPTION	M	P
`show interfaces config <port-list> bstorm-control`	Displays the current settings for broadcast storm control.	E	13
`storm-control`	Enables broadcast storm control on the Switch.	C	13
`no storm-control`	Disables broadcast storm control on the Switch.	C	13
`storm-limit`	Enables broadcast rate limit on the Switch.	C	13
`storm-limit CIR <cir>`	Sets the guaranteed data rate allowed for the broadcast, DLF and multicast packets. *cir*: Enters the committed information rate from 1 to 16384 kbps.	C	13
`no storm-limit`	Disables broadcast rate limit on the Switch.	C	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`broadcast-limit`	Enables the broadcast packet limit on the specified port(s).	C	13
`broadcast-limit <pkt/s>`	Sets the broadcast packet limit (in packets per second) on the specified port(s).	C	13
`no broadcast-limit`	Disables the broadcast packet limit on the specified port(s).	C	13
`dlf-limit`	Enables the Destination Lookup Failure (DLF) packet limit.	C	13
`dlf-limit <pkt/s>`	Sets the DLF packet limit (in packets per second) on the specified port(s).	C	13
`no dlf-limit`	Disables the destination lookup failure (DLF) packet limit on the specified port(s).	C	13

Table 25 storm-control, bmstorm-control, and limit Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`multicast-limit`	Enables the multicast packet limit on the specified port(s).	C	13
`multicast-limit <pkt/s>`	Sets the multicast packet limit (in packets per second) on the specified port(s).	C	13
`no multicast-limit`	Disables the multicast packet limit on the specified port(s).	C	13

9.2 Command Examples

This example enables broadcast storm control on port 1 and limits the maximum number of broadcast packets to 128 packets per second.

```
sysname# configure
sysname(config)# storm-control
sysname(config)# interface port-channel 1
sysname(config-interface)# broadcast-limit
sysname(config-interface)# broadcast-limit 128
sysname(config-interface)# exit
sysname(config)# exit
```

10

CFM commands

Use these commands to configure the Connectivity Fault Management (CFM) on the Switch.

10.1 CFM Term Definition

This section lists the common term definition appears in this chapter. Refer to User's Guide for more detailed information about CFM.

Table 26 CFM Term Definition

TERM	DESCRIPTION
CFM	CFM (Connectivity Fault Management) is used to detect, analyze connectivity faults in bridged LANs.
MD	An MD (Maintenance Domain) is a group identified by a level number. You can create more than one MA groups in one MD.
MA	An MA (Maintenance Association) is a group identified by a VLAN ID. One MA should belong to one and only one MD group.
CFM Domain	A CFM domain is a group identified by an MD and an MA. For example, ports in MD level 1 and MA VLAN 2 are in the same CFM domain while ports in MD level 7 and MA VLAN 2 are in another CFM domain.
CFM Action	CFM provides three tests to discover connectivity faults. • **CC** (Connectivity Check) - enables an MEP port sending Connectivity Check Messages (CCMs) periodically to other MEP ports. An MEP port collects CCMs to get other MEP information within an MA. • **LBT** (Loop Back Test) - checks if the MEP port receives its LBR (Loop Back Response) from its target after it sends the LBM (Loop Back Message). If no response is received, there might be a connectivity fault between them. • **LTT** (Link Trace Test) - provides additional connectivity fault analysis to get more information on where the fault is. In the link trace test, MIP ports also send LTR (Link Trace Response) to response the source MEP port's LTM (Link Trace Message). If an MIP or MEP port does not respond to the source MEP, this may indicate a fault. Administrators can take further action to check and resume services from the fault according to the line connectivity status report.
MEP	An MEP port has the ability to send and reply the CCMs, LBMs and LTMs. It also gets other MEP port information from neighbor switches' CCMs in an MA.
MIP	An MIP port forwards the CCMs, LBMs, and LTMs and replies the LBMs and LTMs by sending Loop Back Responses (LBRs) and Link Trace Responses (LTRs).

10.2 User Input Values

This section lists the common term definition appears in this chapter. Refer to User's Guide for more detailed information about CFM.

Table 27 CFM command user input values

USER INPUT	DESCRIPTION
`level <0~7> vlan <1~4094>`	This identifies a specified CFM domain which consists of an MD level and an MA VLAN ID.

10.3 Command Summary

The following section lists the commands for this feature.

Table 28 CFM Command Summary

COMMAND	DESCRIPTION	M	P
`cfm domain <domain-name> level <0~7>`	Creates an MD with the name and the level number.	C	13
`service <ma-name> vlan <1~4094> [name-format <1:PVID|2:String|3:Integer>]`	Creates an MA (Maintenance Association) and defines its VLAN ID under the MD. You can also define the format which the Switch uses to send this MA information in the domain (MD). Note: This specified VLAN ID must be existed already before you specify it for an MA.	C	13
`service <ma-name> ccm-interval <3~7>`	Sets the time interval the Switch waits to send a connectivity check message (CCM). 3: 100 milliseconds, 4: 1 second, 5: 10 second, 6: 1 minute, 7: 10 minute	C	13
`no service <ma-name>`	Deletes the MA under the MD.	C	13
`cfm debug <0:disable|1:enable>`	Disables or enables the CFM debug mode.	C	13
`cfm-action enable`	Enables the global switch of CFM action.	C	13
`cfm-action cc level <0~7> vlan <1~4094>`	Enables Connectivity Check (CC) in the MD level and the MA VLAN. This enables all MEP ports in a specified CFM domain to send CCM (Connectivity Check message).	C	13
`cfm-action loopback level <0~7> vlan <1~4094> mepid <1~8191> destination <dest-mac-address> count <count>`	Specify the MD level, MA vlan ID, MEP ID, destination MAC address and how many times to perform a loopback test. This enables the MEP port (with the specified MEP ID) in a specified CFM domain to send the LBM (Loop Back Message) to a specified remote interface a specified number of times.	C	13
`cfm-action loopback level <0~7> vlan <1~4094> mepid <1~8191> target-mepid <1~8191> count <count>`	This enables the MEP port (with the specified MEP ID) in a specified CFM domain to send the LBM (Loop Back Message) to a specified remote MEP.	C	13
`cfm-action loopback print`	Displays the loopback testing result in the console.	C	13
`cfm-action loopback interval <interval>`	Sets the loopback test interval. Each unit represents 100 ms.	C	13

Table 28 CFM Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`cfm-action linktrace level <0~7> vlan <1~4094> mepid <1~8191> destination <dest-mac-address>`	Specifies the MD level, MA vlan ID, MEP ID, destination MAC address to perform a link trace test. This enables the MEP port (with the specified MEP ID) in a specified CFM domain to send the LTM (Link Trace Message) to a specified remote interface.	C	13
`cfm-action linktrace level <0~7> vlan <1~4094> mepid <1~8191> target-mepid <1~8191>`	This enables the MEP port (with the specified MEP ID) in a specified CFM domain to send the LTM (Link Trace Message) to a specified remote MEP.	C	13
`clear cfm mep-counter level <0~7> vlan <1~4094> mepid <1~8191>`	Removes the CFM counters for the specified MEP port.	E	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`cfm mip level <level> vlan <vlan_id>`	Associates MIP ports with the specified CFM domain.	C	13
`cfm mep level <level> mepid <mepid> vlan <vlan_id> [direction <1:downstream|2:upstream>]`	Associates MEP ports with the specified CFM domain.	C	13
`no cfm mip level <level> vlan <vlan_id>`	Unassociates MEP ports with the specified CFM domain.	C	13
`no cfm mep level <level> vlan <vlan_id>`	Unassociates MIP ports with the specified CFM domain.	C	13
`no cfm domain <domain-name|all>`	Deletes a specified MD or all MDs.	C	13
`no cfm-action enable`	Disables the global switch of CFM action.	C	13
`no cfm-action cc level <0~7> vlan <1~4094>`	Stops all MEP ports sending the CCM in the specified CFM domain.	C	13
`no cfm-action loopback level <0~7> vlan <1~4094> mepid <mepid>`	Stops the loopback test from the MEP port (with the specified MEP ID) in the specified CFM domain.	C	13
`no cfm-action loopback print`	Disables the loopback testing result displaying in the console.	C	13
`show cfm domain <domain-name|all>`	Displays CFM domains (MD; Maintenance Domain).	E	13
`show cfm-action`	Displays CFM action settings.	E	13
`show cfm-action counter level <0~7> vlan <1~4094> mepid <1~8191>`	Displays the index number for each test try from the MEP port (with the specified MEP ID) in a specified CFM domain. Use this to check the progress of a CFM test.	E	13
`show cfm-action mepccmdb level <0~7> vlan <1~4094>`	Displays the MEP-CCM database information which stores neighbors' MEP ports information getting from the incoming CC in the specified CFM domain. You can use this database information to provide the destination's (an MEP port) MAC address when starting a CFM action such as loopback test or link trace test.	E	13
`show cfm-action mipccmdb level <0~7> vlan <1~4094>`	Displays the MIP-CCM database information which stores neighbors' MEP ports information getting from the incoming CC in the specified CFM domain. Local MIP ports use this database information to forward CFM messages.	E	13

Table 28 CFM Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`show cfm-action ltmreplylist level <0~7> vlan <1~4094> mepid <1~8191>`	Displays the LTM response list in a link trace test.	E	13
`show cfm-action ltmreplylist level <0~7> vlan <1~4094> mepid <1~8191> transid <trans-id>`	Displays the LTM response list for the specified transaction in a link trace test. *trans-id*: This is the index number of the LTM sent in a link trace test.	E	13

10.4 Command Examples

This example creates **MD1** (with level 1). Then it creates **MA2** (with VLAN 2) and **MA3** (with VLAN 3) under **MD1** that defines a CFM domain.

```
sysname# config
sysname(config)# cfm domain MD1 level 1
sysname(config-CFM_MD(1-1))# service MA2 vlan 2
sysname(config-CFM_MD(1-1))# service MA3 vlan 3
sysname(config-CFM_MD(1-1))# exit
sysname(config)# exit
sysname# write memory
```

Remember to save new settings using `write memory` command.

This example deletes **MA3** from **MD1**.

```
sysname# config
sysname(config)# cfm domain MD1 level 1
sysname(config-CFM_MD(1-1))# no service MA3
sysname(config-CFM_MD(1-1))# exit
sysname(config)# exit
sysname# write memory
```

This example associates port 17 as an MEP port with MEP ID 100 and port 18 as an MIP port in the specified CFM domain (MD level 1, MA VLAN 2).

```
sysname(config)# interface port-channel 17
sysname(config-interface)# cfm mep level 100 mepid 1 vlan 2
sysname(config-interface)# exit
sysname(config)# interface port-channel 18
sysname(config-interface)# cfm mip level 1 vlan 2
sysname(config-interface)# exit
sysname(config)# exit
sysname# write memory
```

This example lists all CFM domains. In this example, only one MD (**MD1**) is configured. The **MA2** with the associated MEP ID **100** and MIP port **17** and **18** are under this **MD1**.

```
sysname# show cfm domain all
Maintenance Domain:
  Name: MD1, Level: 1
Service Instance:
  ID: MA2, VLAN ID: 2, CCM Interval: 1 sec
  Short MA name Format: Integer
MEP:
  Port: 17, ID:   100
MIP:
  Port: 18
```

This example enables CFM action and then displays the CFM action status, loopback message result printing (is off) and the interval a MEP sends a loopback message (every 1000 milliseconds).

```
sysname(config)# cfm-action enable
sysname# show cfm-action
Status: Enabled
Print Loopback Message: N
Interval to Send Loopback Message: 10 * 100ms
```

This example enables the loopback test result displaying on the console. It starts a LBT (Loop Back Test) and sends an LBM five times. You can see each LBM (Loop Back Message) with the transaction ID numbers shown next to it.

```
sysname# config
sysname(config)# cfm-action loopback print
sysname(config)# cfm-action loopback level 1 vlan 2 mepid 15 destination
00a0c5134925 count 5
sysname(config)#
LBM sent to 25:13:f4:e8:02:13 transaction ID: 0
LBM sent to 25:13:f4:e8:02:13 transaction ID: 1
LBM sent to 25:13:f4:e8:02:13 transaction ID: 2
LBM sent to 25:13:f4:e8:02:13 transaction ID: 3
...
```

This example displays all neighbors' MEP port information in the MEP-CCM and MIP-CCM databases. You can use the MEP-CCM database to get and use a MAC address as the destination to starting a CFM test. But for the MIP-CCM database, local MIP ports use the information to forward CFM messages.

```
sysname# show cfm-action mepccmdb level 2 vlan 101
MEP ID  MAC Address        lastRDI     last SeqNum     CCMdefect
     1  00:19:cb:00:12:35        N             176             N

sysname# show cfm-action mipccmdb level 2 vlan 101
MEP ID  VLAN ID   MAC Address          Port
     1      101   00:19:cb:00:12:35      26
```

The following table describes the labels in this screen.

Table 29 show cfm-action mepccmdb

LABEL	DESCRIPTION
MEP ID	Displays neighbors' MEP's MEP ID coming from the incoming CCM (Connectivity Check Message).
MAC Address	Displays the MAC address of the MEP port.
lastRDI	Displays the state of the RDI (Remote Defect Indication) coming from the last incoming CCM (Connectivity Check Message). This indicates whether the MEP detected connectivity faults.
last SeqNum	Displays the sequence number of the last received CCM.
CCMdefect	Displays whether the switch received this MEP's CCMs during the last time interval (3.25 multiplied by the CCM interval value). **Y** displays if the MEP has not received any CCMs for a while and there might be a connectivity fault between the device and the remote MEP. Otherwise, it displays **N**.

Table 30 show cfm-action mipccmdb

LABEL	DESCRIPTION
MEP ID	Displays the neighbor MEP port's ID number.
VLAN ID	Displays the MA VLAN ID of the last received CCM.
MAC Address	Displays the MAC address of the MEP port.
Port	Displays the MEP port's number on the switch receiving the last CCM.

This example displays a loopback test report initialized from a MEP 101 which belongs to MD level 1 and VLAN 1.

```
sysname# cfm-action counter level 1 vlan 1 mepid 101
someMACstatusDefect: N
someRMEPCCMdefect: N
errorCCMdefect: N
xconCCMdefect: N
CCMsequenceErrors: 0
CCIsentCCMs: 343
nextLBMtransID: 100
expectedLBRtransID: 100
inorderLBRs: 100
outorderLBRs: 0
unmatchedLBRs: 0
nextLTMtransID: 2
unexpectedLTRs: 0
transmittedLBRs: 10
```

The following table describes the labels in this screen.

Table 31 show cfm-action counter

LABEL	DESCRIPTION
someMACstatusDefect	This field displays **Y** if remote MEP(s) detected an OSI layer-2 problem. Otherwise, it displays **N**. A broken link connection or port is an example of an OSI layer-2 problem.
someRMEPCCMdefect	This field displays **Y** if remote MEP(s) didn't receive some CCMs (connectivity check messages). Otherwise, it displays **N**.

Table 31 show cfm-action counter (continued)

LABEL	DESCRIPTION
errorCCMdefect	This field displays **Y** if remote MEP(s) received erroneous CCMs. Otherwise, it displays **N**.
xconCCMdefect	This field displays **Y** if remote MEP(s) received CCMs which belong to other MA (maintenance association). Otherwise, it displays **N**.
CCMsequenceErrors	This field displays the number of out-of-sequence CCMs the MEP has received.
CCIsentCCMs	This field displays the number of CCMs the MEP has transmitted.
nextLBMtransID	This field displays the transaction ID with which the MEP should transmit in the next loopback message (LBM).
expectedLBRtransID	This field displays the transaction ID with which the MEP expects to receive in the next loopback response (LBR) message sent from a remote MEP.
inorderLBRs	This field displays the number of in-order LBR messages the MEP has received since it started up.
outorderLBRs	This field displays the number of out-of-order LBR messages the MEP has received since it started up. The higher number of this field might due to a fault connectivity between the MEP and a remote MEP.
unmatchedLBRs	This field displays the number of LBR messages with unexpected content information the MEP has received since it started up.
nextLTMtransID	This field displays the transaction ID with which the MEP will transmit in the next LTM (link trace message).
unexpectedLTRs	This field displays the number of unexpected LTR (link trace response) messages the MEP has received since it started up.
transmittedLBRs	This field displays the total number of LBR messages the MEP has transmitted.

11

Classifier Commands

Use these commands to identify traffic flows based on various criteria. After you identify a traffic flow, you can specify the treatment it gets in the network using policy commands (see Chapter 49 on page 181).

11.1 Command Summary

The following section lists the commands for this feature.

Table 32 classifier Command Summary

COMMAND	DESCRIPTION	M	P
`show classifier [name]`	Displays all classifier-related information. Optionally, displays the specified classifier.	E	13
`classifier <name> <[packet-format <802.3untag|802.3tag|EtherIIuntag|EtherIItag>][priority<0-7>] [vlan <vlan-id>] [ethernet-type <ether-num|ip|ipv6|ipx|arp|rarp|appletalk|decnet|sna|netbios|dlc>] [source-mac <src-mac-addr>] [source-port <port-num>] [destination-mac <dest-mac-addr>] [dscp <0-63>] [ip-protocol <protocol-num|tcp|udp|icmp|egp|ospf|rsvp|igmp|igp|pim|ipsec> [establish-only]] [source-ip <src-ip-addr> [mask-bits <mask-bits>]] [ipv6-source-ip <src-ipv6-addr> [mask-bits <mask-bits>]] [source-socket <socket-num>] [destination-ip <dest-ip-addr> [mask-bits <mask-bits>]] [ipv6-destination-ip <dest-ipv6-addr> [mask-bits <mask-bits>]] [destination-socket <socket-num>] [inactive]>`	Configures a classifier. A classifier groups traffic into data flows according to the following criteria: *name*: 1~32 English keyboard characters `packet-format`: Ethernet frame type and VLAN tagging. `priority`: IEEE 802.1p priority. `vlan`: VLAN ID. `ethernet-type`: Protocol number of the frame or pre-defined option. <*ether-num*>: 32-bit Ethernet protocol number in hexadecimal format (FFFF). `source-mac`: Source MAC address. `source-port`: Source port number. `destination-mac`: Destination MAC address. `dscp`: DSCP value. `ip-protocol`: Specific IP protocol number or pre-defined option. *protocol-num*: 8-bit IP protocol number in decimal format (0~255). `source-ip`: Range of source IPv4 addresses, specified by IPv4 address and the number of subnet mask bits. `source-socket`: Source socket number. `destination-ip`: Range of destination IPv4 addresses, specified by IPv4 address and the number of subnet mask bits. `destination-socket`: Destination socket number. `inactive`: Deactivates the classifier. `ipv6-source-ip`: Range of source IPv6 addresses, specified by IPv6 address and the number of subnet mask bits. `ipv6-destination-ip`: Range of destination IPv6 addresses, specified by IPv6 address and the number of subnet mask bits. `destination-socket`: Destination socket number. The options vary depending on your model.	C	13
`no classifier <name>`	Disables the classifier. Each classifier has one rule. If you disable a classifier you cannot use policy rule related information.	C	13
`no classifier <name> inactive`	Enables a classifier.	C	13
`classifier help`	Provides more information about the specified command.	C	13

11.2 Command Examples

See Chapter 49 on page 181.

12

Cluster Commands

Use these commands to configure cluster management settings. Cluster management allows you to manage switches through one switch, called the cluster manager. The switches must be directly connected and be in the same VLAN group so as to be able to communicate with one another.

12.1 Command Summary

The following section lists the commands for this feature.

Table 33 cluster Command Summary

COMMAND	DESCRIPTION	M	P
`show cluster`	Displays all classifier related information.	E	13
`show cluster candidates`	Displays cluster candidate information.	E	13
`show cluster member`	Displays the MAC address of the cluster member(s).	E	13
`show cluster member config`	Displays the configuration of the cluster member(s).	E	13
`show cluster member mac <mac-address>`	Displays the status of the cluster member(s).	E	13
`no classifier <name>`	Disables the classifier. Each classifier has one rule. If you disable a classifier you cannot use policy rule related information.	C	13
`cluster <vlan-id>`	Sets the cluster management VLAN ID.	C	13
`cluster member <mac-address> password <password>`	Sets the cluster member switch's hardware MAC address and password.	C	13
`cluster name <cluster-name>`	Configures a name to identify the cluster manager.	C	13
`cluster rcommand <mac-address>`	Logs into a cluster member switch.	C	13
`no cluster`	Disables cluster management on the Switch.	C	13
`no cluster member <mac-address>`	Removes the cluster member.	C	13

12.2 Command Examples

This example creates the cluster CManage in VLAN 1. Then, it looks at the current list of candidates for membership in this cluster and adds two switches to cluster.

```
sysname# configure
sysname(config)# cluster 1
sysname(config)# cluster name CManage
sysname(config)# exit
sysname# show cluster candidates
  Clustering Candidates:
  Index Candidates(MAC/HostName/Model)
      0 00:13:49:00:00:01/VES-1616FB-35/VES-1616FB-35
      1 00:13:49:00:00:02/VES-1616FB-35/VES-1616FB-35
      2 00:19:cb:00:00:02/VES-1616FB-35/VES-1616FB-35
sysname# configure
sysname(config)# cluster member 00:13:49:00:00:01 password 1234
sysname(config)# cluster member 00:13:49:00:00:02 password 1234
sysname(config)# exit
sysname# show cluster member
  Clustering member status:
  Index MACAddr           Name                            Status
      1 00:13:49:00:00:01 VES-1616FB-35                   Online
      2 00:13:49:00:00:02 VES-1616FB-35                   Online
```

The following table describes the labels in this screen.

Table 34 show cluster member

LABEL	DESCRIPTION
Index	This field displays an entry number for each member.
MACAddr	This field displays the member's MAC address.
Name	This field displays the member's system name.
Status	This field displays the current status of the member in the cluster. **Online**: The member is accessible. **Error**: The member is connected but not accessible. For example, the member's password has changed, or the member was set as the manager and so left the member list. This status also appears while the Switch finishes adding a new member to the cluster. **Offline**: The member is disconnected. It takes approximately 1.5 minutes after the link goes down for this status to appear.

This example logs in to the CLI of member 00:13:49:00:00:01, looks at the current firmware version on the member switch, logs out of the member's CLI, and returns to the CLI of the manager.

```
sysname# configure
sysname(config)# cluster rcommand 00:13:49:00:00:01
Connected to 127.0.0.2
Escape character is '^]'.

User name: admin

Password: ****
Copyright (c) 1994 - 2008 ZyXEL Communications Corp.


VES-1616FB-35# show system

System Name             : VES-1616FB-35
System Contact          :
System Location         :
Ethernet Address        : 00:19:cb:d7:e8:7f
ZyNOS F/W Version       : V360AYW0B3 | 09/17/2008
RomRasSize              : 3683034
System up Time          :    26:55:20 (93e369 ticks)
Bootbase Version        : V1.06 | 07/25/2008
VES-1616FB-35# exit
Telnet session with remote host terminated.

Closed
sysname(config)#
```

This example looks at the current status of the Switch's cluster.

```
sysname# show cluster
  Cluster Status: Manager
  VID: 1
  Manager: 00:13:49:ae:fb:7a
```

The following table describes the labels in this screen.

Table 35 show cluster

LABEL	DESCRIPTION
Cluster Status	This field displays the role of this Switch within the cluster. **Manager**: This Switch is the device through which you manage the cluster member switches. **Member**: This Switch is managed by the specified manager. **None**: This Switch is not in a cluster.
VID	This field displays the VLAN ID used by the cluster.
Manager	This field displays the cluster manager's MAC address.

13

Date and Time Commands

Use these commands to configure the date and time on the Switch.

13.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 36 time User-input Values

COMMAND	DESCRIPTION
week	Possible values (`daylight-saving-time` commands only): `first`, `second`, `third`, `fourth`, `last`.
day	Possible values (`daylight-saving-time` commands only): `Sunday`, `Monday`, `Tuesday`, ...
month	Possible values (`daylight-saving-time` commands only): `January`, `February`, `March`, ...
o'clock	Possible values (`daylight-saving-time` commands only): 0-23

The following section lists the commands for this feature.

Table 37 time Command Summary

COMMAND	DESCRIPTION	M	P
`show time`	Displays current system time and date.	E	13
`time <`*`hour`*`:`*`min`*`:`*`sec`*`>`	Sets the current time on the Switch. *hour*: 0~23, *min*: 0~59, *sec*: 0~59 An example, 10:27:30, means the time is at 10 o'clock 27 minutes and 30 seconds. Note: If you configure Daylight Saving Time after you configure the time, the Switch will apply Daylight Saving Time.	C	13
`time date <`*`month/day/year`*`>`	Sets the current date on the Switch. *month*: 1~12, *day*: 1~31, *year*: 1970~2037 An example, 3/20/2008, means the date is in March 20th, 2008.	C	13
`time timezone <-1200|...|1200>`	Selects the time difference between UTC (formerly known as GMT) and your time zone.	C	13
`time daylight-saving-time`	Enables daylight saving time. The current time is updated if daylight saving time has started.	C	13

Table 37 time Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`time daylight-saving-time start-date <week> <day> <month> <o'clock>`	Sets the day and time when Daylight Saving Time starts. In most parts of the United States, Daylight Saving Time starts on the second Sunday of March at 2 A.M. local time. In the European Union, Daylight Saving Time starts on the last Sunday of March at 1 A.M. GMT or UTC, so the *o'clock* field depends on your time zone.	C	13
`time daylight-saving-time end-date <week> <day> <month> <o'clock>`	Sets the day and time when Daylight Saving Time ends. In most parts of the United States, Daylight Saving Time ends on the first Sunday of November at 2 A.M. local time. In the European Union, Daylight Saving Time ends on the last Sunday of October at 1 A.M. GMT or UTC, so the *o'clock* field depends on your time zone.	C	13
`no time daylight-saving-time`	Disables daylight saving on the Switch.	C	13
`time daylight-saving-time help`	Provides more information about the specified command.	C	13
`time help`	Provides more information about the specified command.	C	13

Table 38 timesync Command Summary

COMMAND	DESCRIPTION	M	P
`show timesync`	Displays time server information.	E	13
`timesync server <ip-address>`	Sets the IP address of your time server. The Switch synchronizes with the time server in the following situations: • When the Switch starts up. • Every 24 hours after the Switch starts up. • When the time server IP address or protocol is updated.	C	13
`timesync <daytime|time|ntp>`	Sets the time server protocol. You have to configure a time server before you can specify the protocol.	C	13
`no timesync`	Disables timeserver settings.	C	13

13.2 Command Examples

This example sets the current date, current time, time zone, and daylight savings time.

```
sysname# configure
sysname(config)# time date 06/04/2007
sysname(config)# time timezone -600
sysname(config)# time daylight-saving-time
sysname(config)# time daylight-saving-time start-date second Sunday
--> March 2
sysname(config)# time daylight-saving-time end-date first Sunday
--> November 2
sysname(config)# time 13:24:00
sysname(config)# exit
sysname# show time
Current Time  13:24:03 (UTC-05:00 DST)
Current Date  2007-06-04
```

This example looks at the current time server settings.

```
sysname# show timesync

Time Configuration
----------------------------
Time Zone       :UTC 0
Time Sync Mode  :USE_DAYTIME
Time Server IP Address:172.1.1.2
```

The following table describes the labels in this screen.

Table 39 show timesync

LABEL	DESCRIPTION
Time Zone	This field displays the time zone.
Time Sync Mode	This field displays the time server protocol the Switch uses. It displays NO_TIMESERVICE if the time server is disabled.
Time Server IP Address	This field displays the IP address of the time server.

14

DHCP Commands

Use these commands to configure the DHCP features on the Switch.

14.1 Command Summary

The following section lists the commands for this feature.

Table 40 dhcp Command Summary

COMMAND	DESCRIPTION	M	P
`show dhcp`	Displays DHCP settings on the Switch.	E	13
`dhcp mode <0|1>`	Specifies the DHCP role of the Switch. 0: The Switch is a DHCP server. 1: The Switch is a DHCP relay.	C	13
`dhcp-relay <relay|agent>`	Specifies the DHCP role of the Switch. `relay`: Sets the Switch to be a DHCP relay. `agent`: Sets the Switch to be a DHCP server.	C	13

This section lists the commands for the DHCP relay feature. Note that some commands have a hyphen (dhcp-relay) but some do not (dhcp relay). Make sure which should use on your Switch uses before using the command. You can use a question mark (?) to check the available commands in a mode on your Switch.

Table 41 dhcp relay Command Summary

COMMAND	DESCRIPTION	M	P
`dhcp-relay helper-address <remote-dhcp-server1> [<remote-dhcp-server2> [remote-dhcp-server3]]`	Sets the IP address of up to 3 DHCP servers.	C	13
`dhcp relay helper-address <remote-dhcp-server1> [<remote-dhcp-server2> [remote-dhcp-server3]]`	Sets the IP address of up to 3 DHCP servers.	C	13

Table 41 dhcp relay Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`dhcp relay <vlan-id> helper-address <remote-dhcp-server1> [remote-dhcp-server2] [remote-dhcp-server3] [option] [information <information>] [remote-id <remoteid-information>]`	Enables DHCP relay and configures the settings on the specified VLAN. *remote-dhcp-server*: Type the IP address of a remote DHCP server. option: Set this if you want the Switch to add Option 82 information (slot number, port number, and VLAN ID) to DHCP requests that it relays to a DHCP server. *information*: Type a string (for example, system name) that you want the Switch to add to client DHCP requests. *remoteid-information*: Type up to 15 characters for the remote ID information. Note: You have to enter an existing VLAN ID. You can create VLAN IDs using the `vlan <vlan-id>` command.	C	13
`no dhcp-relay helper-address`	Resets all DHCP server IP addresses that you configured to 0.0.0.0.	C	13
`no dhcp-relay`	Disables the DHCP relay function.	C	13
`no dhcp relay`	Disables the DHCP relay function.	C	13
`dhcp relay information <string>`	Sets the Switch to add the specified string to client DHCP requests that it relays to a DHCP server. <*string*>: 1-30 English keyboard characters.	C	13
`dhcp-relay information`	Sets the Switch to add the system name to client DHCP requests that it relays to a DHCP server.	C	13
`no dhcp-relay information`	Clears the specified string or the system name that the Switch adds to client DHCP requests.	C	13
`no dhcp relay information`	Clears the specified string that the Switch adds to client DHCP requests.	C	13
`dhcp-relay option`	Sets the Switch to add Option 82 information (slot number, port number, and VLAN ID) to DHCP requests that it relays to a DHCP server.	C	13
`dhcp relay option`	Sets the Switch to add Option 82 information (slot number, port number, and VLAN ID) to DHCP requests that it relays to a DHCP server.	C	13
`no dhcp-relay option`	Sets to not append the system name to the option 82 information field in client DHCP requests.	C	13
`no dhcp relay option`	Sets to not append the system name to the option 82 information field in client DHCP requests.	C	13
`dhcp-relay <relay|agent>`	Enables the Switch as a DHCP relay agent on the specified VLAN.	C	13
`dhcp-relay remote-id`	Sets the Switch to add additional information (configured using the `dhcp-relay remoteID-information` command) to client DHCP requests that it relays to a DHCP server.	C	13
`no dhcp-relay remote-id`	Clears the specified remote ID information that the Switch adds to client DHCP requests.	C	13
`dhcp-relay remoteID-information <remoteid-information>`	Sets the Switch to add the specified string as remote ID information to client DHCP requests that it relays to a DHCP server.	C	13

Table 41 dhcp relay Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`dhcp relay <vlan-id>`	Enables the Switch as a DHCP relay agent on the specified VLAN.	C	13
`no dhcp relay <vlan-id>`	Disables DHCP relay on the specified VLAN.	C	13
`show dhcp dhcp-relay`	Displays the DHCP relay settings that are applied to the whole system.	E	13
`show dhcp relay <vlan-id>`	Displays the DHCP relay settings on the specified VLAN.	E	13
`show dhcp relay all`	Displays DHCP relay settings on all VLANs.	E	13
`no dhcp relay <vlan-id> information`	Clears the specified string that the Switch adds to client DHCP requests on the specified VLAN.	C	13
`no dhcp relay <vlan-id> option`	Sets to not append the system name to the option 82 information field in client DHCP requests on the specified VLAN.	C	13
`no dhcp relay <vlan-id> remote-id`	Clears the specified remote ID information that the Switch adds to client DHCP requests on the specified VLAN.	C	13
`dhcp relay-broadcast`	Enables the DHCP relay broadcast function.	C	13
`no dhcp relay-broadcast`	Disables the DHCP relay broadcast function.	C	13

Table 42 dhcp server Command Summary

COMMAND	DESCRIPTION	M	P
`dhcp server starting-address <ip> <mask> size-of-client-ip-pool <1~253> [default-gateway <ip-address>] [primary-dns <ip-address>] [secondary-dns <ip-address>]`	Configures the Switch as a DHCP server and configures the range of IP addresses the Switch can assign to DHCP clients. Optionally, specifies the default gateway and DNS server(s) provided to DHCP clients as well.	C	13
`no dhcp server`	Disables the DHCP server in the Switch.	C	13
`no dhcp server default-gateway`	Clears the default gateway setting.	C	13
`no dhcp server primary-dns`	Clears the primary DNS server setting.	C	13
`no dhcp server secondary-dns`	Clears the secondary DNS server setting.	C	13

Table 43 dhcp smart-relay Command Summary

COMMAND	DESCRIPTION	M	P
`show dhcp smart-relay`	Displays global DHCP relay settings.	E	13
`no dhcp smart-relay`	Disables global DHCP relay on the Switch.	C	13
`dhcp smart-relay`	Enables global DHCP relay on the Switch. The Switch forwards all DHCP requests to the same DHCP server. Note: You can enable one DHCP relay method (DHCP relay on a VLAN or global DHCP relay) at the same time.	C	13
`dhcp smart-relay helper-address <remote-dhcp-server1> [remote-dhcp-server2] [remote-dhcp-server3]`	Sets the global DHCP relay settings. *remote-dhcp-server*: Type the IP address of a remote DHCP server.	C	13
`dhcp smart-relay information`	Sets the Switch to add the system name to client DHCP requests that it relays to a DHCP server.	C	13

Table 43 dhcp smart-relay Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no dhcp smart-relay information`	Stops the Switch to add the system name to client DHCP requests.	C	13
`dhcp smart-relay option`	Sets the Switch to add Option 82 information (slot number, port number, and VLAN ID) to DHCP requests that it relays to a DHCP server.	C	13
`no dhcp smart-relay option`	Stops the System to add Option 82 information to DHCP requests.	C	13
`dhcp smart-relay option-information <string>`	Sets the Switch to add the specified string to client DHCP requests that it relays to a DHCP server.	C	13
`dhcp smart-relay remote-id`	Sets the Switch to add information configured using the `dhcp smart-relay remoteID-information` command to client DHCP requests that it relays to a DHCP server.	C	13
`no dhcp smart-relay remote-id`	Stops the Switch to add information configured using the `dhcp smart-relay remoteID-information` command to client DHCP requests.	C	13
`dhcp smart-relay remoteID-information <`*`remoteid-information`*`>`	Sets remote ID information which you want the Switch to add to client DHCP requests that it relays to a DHCP server. *`remoteid-information`*: Type up to 15 characters for the remote ID information.	C	13

14.2 Command Examples

This example configures the Switch to relay DHCP requests to 192.168.10.1 and to add the system name `sysname` to the requests.

```
sysname# configure
sysname(config)# dhcp agent
sysname(config)# dhcp-relay helper-address 192.168.10.1
sysname(config)# dhcp-relay information sysname
sysname(config)# exit
```

or

```
sysname# configure
sysname(config)# dhcp mode 1
sysname(config)# dhcp relay helper-address 192.168.10.1
sysname(config)# dhcp relay information sysname
sysname(config)# exit
```

This example configures the Switch as a DHCP server that can assign IP addresses 192.168.1.32~192.168.1.63.

```
sysname# configure
sysname(config)# dhcp server starting-address 192.168.1.32 255.255.255.0
--> size-of-client-ip-pool 32
sysname(config)# exit
```

This example configures the following global DHCP relay settings on the Switch.

- Enables globally DHCP relay.
- Forward all DHCP requests to 192.168.10.1.
- Add the system name `sysname` to the DHCP requests.
- Add remote ID information `ABC` to the DHCP requests.
- Displays all global DHCP relay settings.

```
sysname# configure
sysname(config)# dhcp smart-relay
sysname(config)# dhcp smart-relay helper-address 192.168.10.1
sysname(config)# dhcp smart-relay information sysname
sysname(config)# dhcp smart-relay remoteID-information ABC
sysname(config)# dhcp smart-relay remote-id
sysname(config)# exit
sysname# show dhcp smart-relay
  DHCP Relay Agent Configuration
  Active:       Yes
  Remote DHCP Server 1:192.168.10.1
  Remote DHCP Server 2:   0.0.0.0
  Remote DHCP Server 3:   0.0.0.0
  Option82: Disable     Option82Inf:  Enable:
  Remote ID:  Enable     RemoteIDInf:            ABC
sysname#
```

15

DHCP Snooping & DHCP VLAN Commands

Use the `dhcp snooping` commands to configure the DHCP snooping on the Switch and the `dhcp vlan` commands to specify a DHCP VLAN on your network. DHCP snooping filters unauthorized DHCP packets on the network and builds the binding table dynamically.

15.1 Command Summary

The following section lists the commands for this feature.

Table 44 dhcp snooping Command Summary

COMMAND	DESCRIPTION	M	P
`show dhcp snooping`	Displays DHCP snooping configuration on the Switch.	E	3
`show dhcp snooping binding`	Displays the DHCP binding table.	E	3
`show dhcp snooping database`	Displays DHCP snooping database update statistics and settings.	E	3
`show dhcp snooping database detail`	Displays DHCP snooping database update statistics in full detail form.	E	3
`dhcp snooping`	Enables DHCP Snooping on the Switch.	C	13
`no dhcp snooping`	Disables DHCP Snooping on the Switch.	C	13
`dhcp snooping database <tftp://host/filename>`	Specifies the location of the DHCP snooping database. The location should be expressed like this: **tftp://{domain name or IP address}/directory, if applicable/file name**; for example, **tftp://192.168.10.1/database.txt**.	C	13
`no dhcp snooping database`	Removes the location of the DHCP snooping database.	C	13
`dhcp snooping database timeout <seconds>`	Specifies how long (10-65535 seconds) the Switch tries to complete a specific update in the DHCP snooping database before it gives up.	C	13
`no dhcp snooping database timeout`	Resets how long (10-65535 seconds) the Switch tries to complete a specific update in the DHCP snooping database before it gives up to the default value (300).	C	13
`dhcp snooping database write-delay <seconds>`	Specifies how long (10-65535 seconds) the Switch waits to update the DHCP snooping database the first time the current bindings change after an update.	C	13
`no dhcp snooping database write-delay <seconds>`	Resets how long (10-65535 seconds) the Switch waits to update the DHCP snooping database the first time the current bindings change after an update to the default value (300).	C	13

Table 44 dhcp snooping Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`dhcp snooping vlan <vlan-list>`	Specifies the VLAN IDs for VLANs you want to enable DHCP snooping on.	C	13
`no dhcp snooping vlan <vlan-list>`	Specifies the VLAN IDs for VLANs you want to disable DHCP snooping on.	C	13
`dhcp snooping vlan <vlan-list> information`	Sets the Switch to add the system name to DHCP requests that it broadcasts to the DHCP VLAN, if specified, or VLAN.	C	13
`no dhcp snooping vlan <vlan-list> information`	Sets the Switch to not add the system name to DHCP requests that it broadcasts to the DHCP VLAN, if specified, or VLAN.	C	13
`dhcp snooping vlan <vlan-list> option`	Sets the Switch to add the slot number, port number and VLAN ID to DHCP requests that it broadcasts to the DHCP VLAN, if specified, or VLAN.	C	13
`no dhcp snooping vlan <vlan-list> option`	Sets the Switch to not add the slot number, port number and VLAN ID to DHCP requests that it broadcasts to the DHCP VLAN, if specified, or VLAN.	C	13
`clear dhcp snooping database statistics`	Delete all statistics records of DHCP requests going through the Switch.	E	13
`renew dhcp snooping database`	Loads dynamic bindings from the default DHCP snooping database.	E	13
`renew dhcp snooping database <tftp://host/filename>`	Loads dynamic bindings from the specified DHCP snooping database.	E	13
`interface port-channel <port-list>`	Enables a port or a list of ports for configuration.	C	13
`dhcp snooping trust`	Sets this port as a trusted DHCP snooping port. Trusted ports are connected to DHCP servers or other switches, and the Switch discards DHCP packets from trusted ports only if the rate at which DHCP packets arrive is too high.	C	13
`dhcp snooping limit rate <pps>`	Sets the maximum rate in packets per second (pps) that DHCP packets are allowed to arrive at a trusted DHCP snooping port.	C	13
`no dhcp snooping trust`	Disables this port from being a trusted port for DHCP snooping.	C	13
`no dhcp snooping limit rate`	Resets the DHCP snooping rate to the default (0).	C	13

The following table describes the `dhcp-vlan` commands.

Table 45 dhcp-vlan Command Summary

COMMAND	DESCRIPTION	M	P
`dhcp dhcp-vlan <vlan-id>`	Specifies the VLAN ID of the DHCP VLAN.	C	13
`no dhcp dhcp-vlan`	Disables DHCP VLAN on the Switch.	C	13

15.2 Command Examples

This example:

- Enables DHCP snooping on the Switch.
- Sets up an external DHCP snooping database on a network server with IP address 172.16.3.17.

- Enables DHCP snooping on VLANs 1,2,3,200 and 300.
- Sets the Switch to add the slot number, port number and VLAN ID to DHCP requests that it broadcasts to the DHCP VLAN.
- Sets ports 1 - 5 as DHCP snooping trusted ports.
- Sets the maximum number of DHCP packets that can be received on ports 1 - 5 to 100 packets per second.
- Configures a DHCP VLAN with a VLAN ID 300.
- Displays DHCP snooping configuration details.

```
sysname(config)# dhcp snooping
sysname(config)# dhcp snooping database tftp://172.16.3.17/snoopdata.txt
sysname(config)# dhcp snooping vlan 1,2,3,200,300
sysname(config)# dhcp snooping vlan 1,2,3,200,300 option
sysname(config)# interface port-channel 1-5
sysname(config-interface)# dhcp snooping trust
sysname(config-interface)# dhcp snooping limit rate 100
sysname(config-interface)# exit
sysname(config)# dhcp dhcp-vlan 300
sysname(config)# exit
sysname# show dhcp snooping
  Switch DHCP snooping is enabled
  DHCP Snooping is configured on the following VLANs:
    1-3,200,300
  Option 82 is configured on the following VLANs:
    1-3,200,300
  Appending system name is configured on the following VLANs:

  DHCP VLAN is disabled
Interface  Trusted  Rate Limit (pps)
---------  -------  ---------------
        1      yes             1000
        2      yes             1000
        3      yes             1000
        4      yes             1000
        5      yes             1000
        6       no         unlimited
        7       no         unlimited
        8       no         unlimited
        9       no         unlimited
       10       no         unlimited
       11       no         unlimited
       12       no         unlimited
       13       no         unlimited
       14       no         unlimited
       15       no         unlimited
       16       no         unlimited
       17       no         unlimited
       18       no         unlimited
sysname#
```

16

DiffServ Commands

Use these commands to configure Differentiated Services (DiffServ) on the Switch.

16.1 Command Summary

The following section lists the commands for this feature.

Table 46 diffserv Command Summary

COMMAND	DESCRIPTION	M	P
`show diffserv`	Displays general DiffServ settings.	E	13
`diffserv`	Enables DiffServ on the Switch.	C	13
`no diffserv`	Disables DiffServ on the Switch.	C	13
`diffserv dscp <0~63> priority <0~7>`	Sets the DSCP-to-IEEE 802.1q mappings.	C	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`diffserv`	Enables DiffServ on the port(s).	C	13
`no diffserv`	Disables DiffServ on the port(s).	C	13

17

DoS Prevention Commands

Use these commands to configure DoS Prevention on the Switch.

17.1 Command Summary

The following section lists the commands for this feature.

Table 47 diffserv Command Summary

COMMAND	DESCRIPTION	M	P
`DoS-prevention-setting active`	Enables DoS prevention on the Switch.	C	13
`DoS-prevention-setting ICMP-fragment`	Drops any fragmented ICMP packets.	C	13
`DoS-prevention-setting IP-address-checking`	Drops any IP packets whose source IP address and destination IP address are the same.	C	13
`DoS-prevention-setting Mac-address-checking`	Drops any packets whose source MAC address and destination MAC address are the same.	C	13
`DoS-prevention-setting TCP-control/SN`	Drops the TCP packets whose control (flag) bit and sequence number are 0.	C	13
`DoS-prevention-setting TCP-FIN/URG/PSH/SN`	Drops the TCP packets whose FIN (Finish), URG (URGent) and PSH (Push) flags bits and sequence number are 0.	C	13
`DoS-prevention-setting TCP-fragment`	Drops the TCP fragments with a Data Offset of 1.	C	13
`DoS-prevention-setting TCP-port`	Drops any TCP packets whose source port and destination port are the same.	C	13
`DoS-prevention-setting TCP-SYN`	Drops any TCP SYN packets whose source port numbers are zero.	C	13
`DoS-prevention-setting TCP-SYN/FIN`	Drops the TCP packets that contain both SYN (SYNchronize) and FIN (Finish) flags.	C	13
`DoS-prevention-setting UDP-port`	Drops any UDP packets whose source port and destination port are the same.	C	13
`no DoS-prevention-setting`	Returns all DoS prevention settings to the defaults.	C	13
`no DoS-prevention-setting active`	Disables DoS prevention on the Switch.	C	13
`no DoS-prevention-setting ICMP-fragment`	Sets the Switch to not drop the fragmented ICMP packets.	C	13
`no DoS-prevention-setting IP-address-checking`	Sets the Switch to not drop the IP packets whose source IP address and destination IP address are the same.	C	13
`no DoS-prevention-setting Mac-address-checking`	Sets the Switch to not drop the packets whose source MAC address and destination MAC address are the same.	C	13

Table 47 diffserv Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no DoS-prevention-setting TCP-control/SN`	Sets the Switch to not drop the TCP packets whose control (flag) bit and sequence number are 0.	C	13
`no DoS-prevention-setting TCP-FIN/URG/PSH/SN`	Sets the Switch to not drop the TCP packets whose FIN (Finish), URG (URGent) and PSH (Push) flags bits and sequence number are 0.	C	13
`no DoS-prevention-setting TCP-fragment`	Sets the Switch to not drop the TCP fragments with a Data Offset of 1.	C	13
`no DoS-prevention-setting TCP-port`	Sets the Switch to not drop the TCP packets whose source port and destination port are the same.	C	13
`no DoS-prevention-setting TCP-SYN`	Sets the Switch to not drop the TCP SYN packets whose source port numbers are zero.	C	13
`no DoS-prevention-setting TCP-SYN/FIN`	Sets the Switch to not drop the TCP packets that contain the SYN (SYNchronize) and FIN (Finish) flags.	C	13
`no DoS-prevention-setting UDP-port`	Sets the Switch to not drop the UDP packets whose source port and destination port are the same.	C	13
`show DoS-prevention-setting`	Displays DoS prevention settings.	E	13

18

Ethernet OAM Commands

Use these commands to use the link monitoring protocol IEEE 802.3ah Link Layer Ethernet OAM (Operations, Administration and Maintenance).

18.1 IEEE 802.3ah Link Layer Ethernet OAM Implementation

Link layer Ethernet OAM (Operations, Administration and Maintenance) as described in IEEE 802.3ah is a link monitoring protocol. It utilizes OAM Protocol Data Units or OAM PDU's to transmit link status information between directly connected Ethernet devices. Both devices must support IEEE 802.3ah. Because link layer Ethernet OAM operates at layer two of the OSI (Open Systems Interconnection Basic Reference) model, neither IP or SNMP are necessary to monitor or troubleshoot network connection problems.

The Switch supports the following IEEE 802.3ah features:

- **Discovery** - this identifies the devices on each end of the Ethernet link and their OAM configuration.
- **Remote Loopback** - this can initiate a loopback test between Ethernet devices.

18.2 Command Summary

The following section lists the commands for this feature.

Table 48 ethernet oam Command Summary

COMMAND	DESCRIPTION	M	P
`show ethernet oam discovery <port-list>`	Displays OAM configuration details and operational status of the specified ports.	E	3
`show ethernet oam statistics <port-list>`	Displays the number of OAM packets transferred for the specified ports.	E	3
`show ethernet oam summary`	Displays the configuration details of each OAM activated port.	E	3
`no ethernet oam`	Disables Ethernet OAM on the Switch.	C	13

18.3 Command Examples

This example performs Ethernet OAM discovery from port 7.

```
sysname# show ethernet oam discovery 7
Port 7
Local client
------------
  OAM configurations:
    Mode              : Active
    Unidirectional    : Not supported
    Remote loopback   : Not supported
    Link events       : Not supported
    Variable retrieval: Not supported
    Max. OAMPDU size  : 1518

  Operational status:
    Link status       : Down
    Info. revision    : 3
    Parser state      : Forward
    Discovery state   : Active Send Local
```

The following table describes the labels in this screen.

Table 49 show ethernet oam discovery

LABEL	DESCRIPTION
OAM configurations	The remote device uses this information to determine what functions are supported.
Mode	This field displays the OAM mode. The device in active mode (typically the service provider's device) controls the device in passive mode (typically the subscriber's device). **Active**: The Switch initiates OAM discovery; sends information PDUs; and may send event notification PDUs, variable request/response PDUs, or loopback control PDUs. **Passive**: The Switch waits for the remote device to initiate OAM discovery; sends information PDUs; may send event notification PDUs; and may respond to variable request PDUs or loopback control PDUs. The Switch might not support some types of PDUs, as indicated in the fields below.
Unidirectional	This field indicates whether or not the Switch can send information PDUs to transmit fault information when the receive path is non-operational.
Remote loopback	This field indicates whether or not the Switch can use loopback control PDUs to put the remote device into loopback mode.
Link events	This field indicates whether or not the Switch can interpret link events, such as link fault and dying gasp. Link events are sent in event notification PDUs and indicate when the number of errors in a given interval (time, number of frames, number of symbols, or number of errored frame seconds) exceeds a specified threshold. Organizations may create organization-specific link event TLVs as well.
Variable retrieval	This field indicates whether or not the Switch can respond to requests for more information, such as requests for Ethernet counters and statistics, about link events.
Max. OAMPDU size	This field displays the maximum size of PDU for receipt and delivery.
Operational status	

Table 49 show ethernet oam discovery (continued)

LABEL	DESCRIPTION
Link status	This field indicates that the link is up or down.
Info. revision	This field displays the current version of local state and configuration. This two-octet value starts at zero and increments every time the local state or configuration changes.
Parser state	This field indicates the current state of the parser. **Forward**: The packet is forwarding packets normally. **Loopback**: The Switch is in loopback mode. **Discard**: The Switch is discarding non-OAMPDUs because it is trying to or has put the remote device into loopback mode.
Discovery state	This field indicates the state in the OAM discovery process. OAM-enabled devices use this process to detect each other and to exchange information about their OAM configuration and capabilities. OAM discovery is a handshake protocol. **Fault**: One of the devices is transmitting OAM PDUs with link fault information, or the interface is not operational. **Active Send Local**: The Switch is in active mode and is trying to see if the remote device supports OAM. **Passive Wait**: The Switch is in passive mode and is waiting for the remote device to begin OAM discovery. **Send Local Remote**: This state occurs in the following circumstances. • The Switch has discovered the remote device but has not accepted or rejected the connection yet. • The Switch has discovered the remote device and rejected the connection. **Send Local Remote OK**: The Switch has discovered the remote device and has accepted the connection. In addition, the remote device has not accepted or rejected the connection yet, or the remote device has rejected the connected. **Send Any**: The Switch and the remote device have accepted the connection. This is the operating state for OAM links that are fully operational.

This example looks at the number of OAM packets transferred on port 1.

```
sysname# show ethernet oam statistics 1
Port 1
Statistics:
-----------
  Information OAMPDU Tx        : 0
  Information OAMPDU Rx        : 0
  Event Notification OAMPDU Tx : 0
  Event Notification OAMPDU Rx : 0
  Loopback Control OAMPDU Tx   : 0
  Loopback Control OAMPDU Rx   : 0
  Variable Request OAMPDU Tx   : 0
  Variable Request OAMPDU Rx   : 0
  Variable Response OAMPDU Tx  : 0
  Variable Response OAMPDU Rx  : 0
  Unsupported OAMPDU Tx        : 0
  Unsupported OAMPDU Rx        : 0
```

The following table describes the labels in this screen.

Table 50 show ethernet oam statistics

LABEL	DESCRIPTION
Information OAMPDU Tx	This field displays the number of OAM PDUs sent on the port.
Information OAMPDU Rx	This field displays the number of OAM PDUs received on the port.
Event Notification OAMPDU Tx	This field displays the number of unique or duplicate OAM event notification PDUs sent on the port.
Event Notification OAMPDU Rx	This field displays the number of unique or duplicate OAM event notification PDUs received on the port.
Loopback Control OAMPDU Tx	This field displays the number of loopback control OAM PDUs sent on the port.
Loopback Control OAMPDU Rx	This field displays the number of loopback control OAM PDUs received on the port.
Variable Request OAMPDU Tx	This field displays the number of OAM PDUs sent to request MIB objects on the remote device.
Variable Request OAMPDU Rx	This field displays the number of OAM PDUs received requesting MIB objects on the Switch.
Variable Response OAMPDU Tx	This field displays the number of OAM PDUs sent by the Switch in response to requests.
Variable Response OAMPDU Rx	This field displays the number of OAM PDUs sent by the remote device in response to requests.
Unsupported OAMPDU Tx	This field displays the number of unsupported OAM PDUs sent on the port.
Unsupported OAMPDU Rx	This field displays the number of unsupported OAM PDUs received on the port.

This example looks at the configuration of ports on which OAM is enabled.

```
sysname# show ethernet oam summary

OAM Config: U : Unidirection, R : Remote Loopback
            L : Link Events , V : Variable Retrieval

    Local         Remote
------------- ----------------------------------------
Port  Mode    MAC Addr          OUI    Mode    Config
----- ------- ----------------- ------ ------- --------
1     Active
```

The following table describes the labels in this screen.

Table 51 show ethernet oam summary

LABEL	DESCRIPTION
Local	This section displays information about the ports on the Switch.
Port	This field displays the port number.
Mode	This field displays the operational state of the port.
Remote	This section displays information about the remote device.
MAC Addr	This field displays the MAC address of the remote device.

Table 51 show ethernet oam summary (continued)

LABEL	DESCRIPTION
OUI	This field displays the OUI (first three bytes of the MAC address) of the remote device.
Mode	This field displays the operational state of the remote device.
Config	This field displays the capabilities of the Switch and remote device. THe capabilities are identified in the **OAM Config** section.

19

External Alarm Commands

Use these commands to configure the external alarm features on the Switch.

19.1 Command Summary

The following section lists the commands for this feature.

Table 52 externalalarm Command Summary

COMMAND	DESCRIPTION	M	P
`externalalarm extalarm1 <alarmname_string>`	Sets the name of the first external alarm. *alarmname_string*: Enters a name of up to 32 ASCII characters.	C	13
`externalalarm extalarm2 <alarmname_string>`	Sets the name of the second external alarm	C	13
`externalalarm extalarm3 <alarmname_string>`	Sets the name of the third external alarm	C	13
`externalalarm extalarm4 <alarmname_string>`	Sets the name of the fourth external alarm	C	13
`no externalalarm extalarm1`	Resets the name of the first external alarm to the default (**External alarm 1**).	C	13
`no externalalarm extalarm2`	Resets the name of the second external alarm to the default (**External alarm 2**).	C	13
`no externalalarm extalarm3`	Resets the name of the third external alarm to the default (**External alarm 3**).	C	13
`no externalalarm extalarm4`	Resets the name of the fourth external alarm to the default (**External alarm 4**).	C	13
`show externalalarm`	Displays external alarm settings.	E	13

19.2 Command Examples

This example configures and shows the name of the external alarm.

```
sysname# configure
sysname(config)# externalalarm extalarm1 dooropen
sysname(config)# exit
sysname# show externalalarm
extalarm1:  dooropen
extalarm2:  External alarm 2
extalarm3:  External alarm 3
extalarm4:  External alarm 4
sysname#
```

20

GARP Commands

Use these commands to configure GARP.

20.1 GARP Overview

Switches join VLANs by making a declaration. A declaration is made by issuing a Join message using GARP. Declarations are withdrawn by issuing a Leave message. A Leave All message terminates all registrations. GARP timers set declaration timeout values.

20.2 Command Summary

The following section lists the commands for this feature.

Table 53 garp Command Summary

COMMAND	DESCRIPTION	M	P
`show garp`	Displays GARP information.	E	13
`garp join <join-timer> leave <200~65535> leaveall <200~65535>`	Configures GARP time settings (in milliseconds), including the join, leave and leave all timers for each port. Leave Time must be at least two times larger than Join Timer, and Leave All Timer must be larger than Leave Timer. *join-timer*:100~65535 or 100~32767. This timer range may vary depending on the Switch model.	C	13

20.3 Command Examples

In this example, the administrator looks at the Switch's GARP timer settings and decides to change them. The administrator sets the Join Timer to 300 milliseconds, the Leave Timer to 800 milliseconds, and the Leave All Timer to 11000 milliseconds.

```
sysname# show garp

GARP Timer
------------------------
Join  Timer      :200
Leave Timer      :600
Leave All Timer  :10000
sysname# configure
sysname(config)# garp join 300 leave 800 leaveall 11000
sysname(config)# exit
sysname# show garp

GARP Timer
------------------------
Join  Timer      :300
Leave Timer      :800
Leave All Timer  :11000
```

21

GPON Command

Use this command to control the GPON module. This command is only applicable for the Switch with GPON module.

21.1 GPON Overview

Gigabit-capable PON (GPON) is a PON technology defined in the ITU-T G.984 standard. It provides up to 1.25 Gbps upstream speed and up to 2.5 Gbps downstream speed. GPON can coexist with ATM (Asynchronous Transfer Mode), Ethernet, and TDM (Time Division Multiplexing, such as T1 and E1) networks. It also supports OAM&P (Operation Administration, Maintenance and Provisioning), security, QoS and upgradable capabilities.

21.2 Command Summary

The following section lists the command for this feature.

Table 54 gpon Command Summary

COMMAND	DESCRIPTION	M	P
`gpon reset`	Restarts the GPON module without restarting the whole Switch. Use this command when the GPON module is not working properly.	E	13

22

GVRP Commands

Use these commands to configure GVRP.

22.1 Command Summary

The following section lists the commands for this feature.

Table 55 gvrp Command Summary

COMMAND	DESCRIPTION	M	P
`show vlan1q gvrp`	Displays GVRP settings.	E	13
`vlan1q gvrp`	Enables GVRP.	C	13
`no vlan1q gvrp`	Disables GVRP on the Switch.	C	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`gvrp`	Enables this function to permit VLAN groups beyond the local Switch.	C	13
`no gvrp`	Disable GVRP on the port(s).	C	13

22.2 Command Examples

This example shows the Switch's GVRP settings.

```
sysname# show vlan1q gvrp

GVRP Support
-----------------------
gvrpEnable = YES
gvrpPortEnable:
```

This example turns off GVRP on ports 1~5.

```
sysname# configure
sysname(config)# interface port-channel 1-5
sysname(config-interface)# no gvrp
sysname(config-interface)# exit
sysname(config)# exit
```

23

HTTPS Server Commands

Use these commands to configure the HTTPS server on the Switch.

23.1 Command Summary

The following section lists the commands for this feature.

Table 56 https Command Summary

COMMAND	DESCRIPTION	M	P
`show https`	Displays the HTTPS settings, statistics, and sessions.	E	13
`show https certificate`	Displays the HTTPS certificates.	E	13
`show https key <rsa|dsa>`	Displays the HTTPS key.	E	13
`show https session`	Displays current settings for HTTPS sessions.	E	13
`show https timeout`	Displays current HTTPS cache timeout.	E	13
`https timeout <0~65535>`	Sets the cache timeout value.	C	13
`no https timeout`	Resets the cache timeout to the default value.	C	13
`https cert-regeneration <rsa|dsa>`	Re-generates a certificate.	C	13

23.2 Command Examples

This example shows the current HTTPS settings, statistics, and sessions.

```
sysname# show https
Configuration
    Version               : SSLv3, TLSv1
    Maximum session number:    64 sessions
    Maximum cache number  :   128 caches
    Cache timeout         :   300 seconds
    Support ciphers       :
        DHE-RSA-AES256-SHA DHE-DSS-AES256-SHA AES256-SHA EDH-RSA-DES-
CBC3-SHA
       EDH-DSS-DES-CBC3-SHA DES-CBC3-SHA DES-CBC3-MD5 DHE-RSA-AES128-SHA
        DHE-DSS-AES128-SHA AES128-SHA DHE-DSS-RC4-SHA IDEA-CBC-SHA RC4-
SHA
        RC4-MD5 IDEA-CBC-MD5 RC2-CBC-MD5 RC4-MD5

Statistics:
    Total connects        :     7
    Current connects      :     2
    Connects that finished:     7
    Renegotiate requested :     0
    Session cache items   :     1
    Session cache hits    :     6
    Session cache misses  :     0
    Session cache timeouts:     0

Sessions:
    Remote IP        Port   Local IP         Port   SSL bytes  Sock bytes
    172.23.5.15      4011   127.0.0.1        1032        4303        2170
    172.23.5.15      4012   127.0.0.1        1033        3697        2161
```

The following table describes the labels in this screen.

Table 57 show https

LABEL	DESCRIPTION
Configuration	
Version	This field displays the current version of SSL (Secure Sockets Layer) and TLS (Transport Layer Security).
Maximum session number	This field displays the maximum number of HTTPS sessions the Switch supports.
Maximum cache number	This field displays the maximum number of entries in the cache table the Switch supports for HTTPS sessions.
Cache timeout	This field displays how long entries remain in the cache table before they expire.
Support ciphers	This field displays the SSL or TLS cipher suites the Switch supports for HTTPS sessions. The cipher suites are identified by their OpenSSL equivalent names. If the name does not include the authentication used, assume RSA authentication. See SSL v2.0, SSL v3.0, TLS v1.0, and RFC 3268 for more information.
Statistics	

Table 57 show https (continued)

LABEL	DESCRIPTION
Total connects	This field displays the total number of HTTPS connections since the Switch started up.
Current connects	This field displays the current number of HTTPS connections.
Connects that finished	This field displays the number of HTTPS connections that have finished.
Renegotiate requested	This field displays the number of times the Switch requested clients to renegotiate the SSL connection parameters.
Session cache items	This field displays the current number of items in cache.
Session cache hits	This field displays the number of times the Switch used cache to satisfy a request.
Session cache misses	This field displays the number of times the Switch could not use cache to satisfy a request.
Session cache timeouts	This field displays the number of items that have expired in the cache.
Sessions	
Remote IP	This field displays the client's IP address in this session.
Port	This field displays the client's port number in this session.
Local IP	This field displays the Switch's IP address in this session.
Port	This field displays the Switch's port number in this session.
SSL bytes	This field displays the number of bytes encrypted or decrypted by the Secure Socket Layer (SSL).
Sock bytes	This field displays the number of bytes encrypted or decrypted by the socket.

This example shows the current settings for HTTPS sessions.

```
sysname# show https session
SSL-Session:
    Protocol  : SSLv3
    Cipher    : RC4-MD5
    Session-ID:
68BFB25BFAFEE3F0F15AB7B038EAB6BACE4AB7A4A6A5280E55943B7191057C96
    Session-ID-ctx: 7374756E6E656C20534944
    Master-Key:
65C110D9BD9BB0EE36CE0C76408C121DAFD1E5E3209614EB0AC5509CDB60D0904937DA4B
A5BA058B57FD7169ACDD4ACF
    Key-Arg   : None
    Start Time: 2252
    Timeout   : 300 (sec)
    Verify return code: 0 (ok)
```

The following table describes the labels in this screen.

Table 58 show https session

LABEL	DESCRIPTION
Protocol	This field displays the SSL version used in the session.
Cipher	This field displays the encryption algorithms used in the session.
Session-ID	This field displays the session identifier.

Table 58 show https session (continued)

LABEL	DESCRIPTION
Session-ID-ctx	This field displays the session ID context, which is used to label the data and cache in the sessions and to ensure sessions are only reused in the appropriate context.
Master-Key	This field displays the SSL session master key.
Key-Arg	This field displays the key argument that is used in SSLv2.
Start Time	This field displays the start time (in seconds, represented as an integer in standard UNIX format) of the session.
Timeout	This field displays the timeout for the session. If the session is idle longer than this, the Switch automatically disconnects.
Verify return code	This field displays the return code when an SSL client certificate is verified.

24

IEEE 802.1x Authentication Commands

Use these commands to configure IEEE 802.1x authentication.

Do not forget to configure the authentication server.

24.1 Command Summary

The following section lists the commands for this feature.

Table 59 port-access-authenticator Command Summary

COMMAND	DESCRIPTION	M	P
`show port-access-authenticator`	Displays all port authentication settings.	E	13
`show port-access-authenticator <port-list>`	Displays port authentication settings on the specified port(s).	E	13
`port-access-authenticator`	Enables 802.1x authentication on the Switch.	C	13
`no port-access-authenticator`	Disables port authentication on the Switch.	C	13
`port-access-authenticator <port-list>`	Enables 802.1x authentication on the specified port(s).	C	13
`no port-access-authenticator <port-list>`	Disables authentication on the listed ports.	C	13
`port-access-authenticator <port-list> reauthenticate`	Sets a subscriber to periodically re-enter his or her username and password to stay connected to a specified port.	C	13
`no port-access-authenticator <port-list> reauthenticate`	Disables the re-authentication mechanism on the listed port(s).	C	13
`port-access-authenticator <port-list> reauth-period <1-65535>`	Specifies how often (in seconds) a client has to re-enter the username and password to stay connected to the specified port(s).	C	13

24.2 Command Examples

This example configures the Switch in the following ways:

1. Specifies the RADIUS server at IP address 10.10.10.1 on port 1890 with the string secretKey as the password.
2. Enables port authentication on the Switch.
3. Enables port authentication on ports 4 to 8.
4. Activates reauthentication on the ports.
5. Specifies 1800 seconds as the interval for client reauthentication.

```
sysname(config)# radius-server host 10.10.10.1 auth-port 1890 key
--> secretKey
sysname(config)# port-access-authenticator
sysname(config)# port-access-authenticator 4-8
sysname(config)# port-access-authenticator 4-8 reauthenticate
sysname(config)# port-access-authenticator 4-8 reauth-period 1800
```

This example configures the Switch in the following ways:

1. Disables authentication on the Switch.
2. Disables re-authentication on ports 1, 3, 4, and 5.
3. Disables authentication on ports 1, 6, and 7.

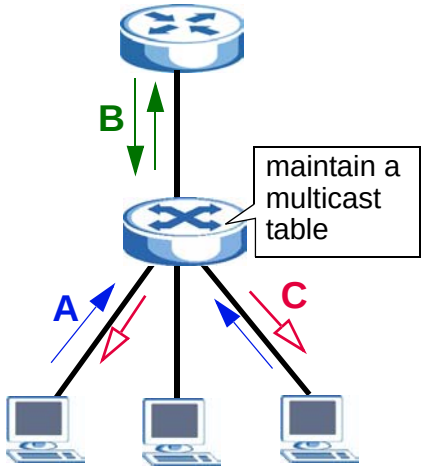
```
sysname(config)# no port-access-authenticator
sysname(config)# no port-access-authenticator 1,3-5 reauthenticate
sysname(config)# no port-access-authenticator 1,6-7
```

25

IGMP Commands

Use these commands to configure IGMP related commands on the Switch. See following for IGMP related term definitions.

- IGMP (Internet Group Management Protocol) - This is a protocol used to establish membership in a multicast group.
- IGMP join/leave reports (**A**) - An IGMP join report is sent from a host when it wants to be a member of a multicast group. When the host doesn't want to be a member of a multicast group any more, it sends an IGMP leave report.
- IGMP query and report (**B**) - A router sends an IGMP query to its downlink switch(es) to ask a multicast group member list (also called multicast table). Then the switch(es) that received the IGMP query send the list to the router.
- IGMP snooping - This feature groups multicast traffic (**C**) and only forwards a group's traffic to ports that are members of that group. Without IGMP snooping, a switch does not understand multicast and will broadcast multicast traffic to all the ports in a network. IGMP snooping generates no additional network traffic, allowing you to significantly reduce multicast traffic passing through your switch.



- IGMP group limit - This feature limits the number of multicast groups a port is allowed to join.
- IGMP immediate leave - The Switch removes a port from the multicast table immediately when an IGMP leave report is received on the port.
- IGMP proxy - The Switch only forwards IGMP join/leave reports to its uplink router when necessary. It can reduce the upstream multicast traffic to the aggregated device significantly.

See Chapter 26 on page 107 for IGMP filtering commands.

25.1 Command Summary

The following section lists the commands for this feature.

Table 60 igmp-flush Command Summary

COMMAND	DESCRIPTION	M	P
`igmp-flush`	Removes all IGMP information.	E	13

Table 61 igmp-snooping Command Summary

COMMAND	DESCRIPTION	M	P
`show igmp-snooping`	Displays global IGMP snooping settings.	E	13
`show igmp-snooping current-group <port-number>`	Displays the number of multicast groups the specified VDSL port is currently a member of.	E	13
`show igmp-snooping join-counetr <port-number>`	Displays the number of IGMP join reports the specified VDSL port received from the VDSL subscriber.	E	13
`show igmp-snooping leave-counetr <port-number>`	Displays the number of IGMP leave reports the specified VDSL port received from the VDSL subscriber.	E	13
`show igmp-snooping querier`	Displays the IGMP query mode for the ports on the Switch.	E	3
`show igmp-snooping query-counetr <port-number>`	Displays the number of the IGMP queries received or transmitted on the specified port.	E	3
`igmp-snooping`	Enables IGMP snooping. Note: You have to disable IGMP proxy before enabling IGMP proxy.	C	13
`no igmp-snooping`	Disables IGMP snooping.	C	13
`igmp-snooping 8021p-priority <0~7>`	Sets the 802.1p priority for outgoing IGMP snooping frames.	C	13
`no igmp-snooping 8021p-priority`	Disables changing the priority of outgoing IGMP control frames.	C	13
`igmp-snooping mld-support`	Enables Multicast Listener Discovery version one (MLD v1) and version two (MLD v2) on the Switch. See Chapter 32 on page 131 for information about MLD.	C	13
`no igmp-snooping mld-support`	Disables MLD v1 and MLD v2 on the Switch.	C	13
`igmp-snooping host-timeout <1-16711450>`	Sets how many seconds to remove an IGMP group membership entry if the Switch does not receive any IGMP join or leave reports from the host.	C	13
`igmp-snooping leave-timeout <1-16711450>`	Sets how many seconds the Switch waits before removing an IGMP snooping membership entry when an IGMP leave report is received from a host.	C	13

Table 61 igmp-snooping Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`igmp-snooping reserve-multicast-frame <drop|flooding>`	Sets the action to perform when the Switch receives a frame with a reserved multicast address. `flooding`: Sets this if you want the Switch to forward the reserved multicast frame to all ports. `drop`: Sets this if you want the Switch to drop the frame.	C	13
`igmp-snooping unknown-multicast-frame <drop|flooding>`	Sets the action to perform when the Switch receives an unknown multicast frame. As the “unknown”, for example, no any subscriber requested to join a multicast group but uplink device sends the group traffic to the Switch. `flooding`: Sets this if you want the Switch to forward the unknown multicast frame to all ports. `drop`: Sets this if you want the Switch to drop the frame.	C	13

Table 62 igmp-snooping vlan Command Summary

COMMAND	DESCRIPTION	M	P
`show igmp-snooping vlan`	Displays the VLANs on which IGMP snooping is enabled.	E	13
`igmp-snooping vlan mode <auto|fixed>`	Specifies how the VLANs on which the Switch snoops IGMP frames are selected. `auto`: The Switch learns multicast group membership on all VLANs. See the User’s Guide for the maximum number of VLANs the switch supports for IGMP snooping. The Switch drops any IGMP control messages after it reaches this maximum number (`auto` mode). `fixed`: The Switch only learns multicast group membership on specified VLAN(s). The Switch drops any IGMP control messages for any unspecified VLANs (`fixed` mode). See the User’s Guide for the maximum number of VLANs the switch supports for IGMP snooping.	C	13
`igmp-snooping vlan <vlan-id> [name <name>]`	Specifies which VLANs to perform IGMP snooping on if the query mode is `fixed`. Optionally, sets a name for the multicast VLAN. *name*: 1-64 printable characters; spaces are allowed if you put the string in double quotation marks (“).	C	13
`no igmp-snooping vlan <vlan-id>`	Removes IGMP snooping configuration on the specified VLAN if the query mode is `fixed`.	C	13

Table 63 igmp-proxy Command Summary

COMMAND	DESCRIPTION	M	P
`show igmp-proxy`	Displays global IGMP proxy settings.	E	13
`show igmp-proxy current-group <port-number>`	Displays the number of IGMP groups the specified VDSL port currently joins.	E	13
`show igmp-proxy join-counetr <port-number>`	Displays the number of IGMP join reports the specified VDSL port received from DSL subscribers.	E	13
`show igmp-proxy leave-counetr <port-number>`	Displays the number of IGMP leave reports the specified VDSL port received from DSL subscribers.	E	13
`show igmp-proxy query-counetr <port-number>`	Displays the number of IGMP query reports the specified VDSL port received from an IGMP multicast router.	E	13

Table 63 igmp-proxy Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`igmp-proxy`	Enables IGMP proxy. Note: You have to disable IGMP snooping before enabling IGMP proxy.	C	13
`no igmp-proxy`	Disables IGMP proxy.	E	13

Table 64 interface igmp Command Summary

COMMAND	DESCRIPTION	M	P
`show interfaces config <port-list> igmp-group-limited`	Displays the group limits for IGMP snooping.	E	13
`show interfaces config <port-list> igmp-immediate-leave`	Displays the immediate leave settings for IGMP snooping.	E	13
`show interfaces config <port-list> igmp-query-mode`	Displays the IGMP query mode setting for the specified port(s).	E	13
`show interfaces config <port-list> igmp-msg-limited`	Displays the IGMP message limits for IGMP snooping.	E	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`igmp-group-limited`	Enables the group limiting feature for IGMP snooping. You must enable IGMP snooping as well.	C	13
`no igmp-group-limited`	Disables multicast group limits.	C	13
`igmp-group-limited number <0~255>`	Sets the maximum number of multicast groups to which the port is allowed to join.	C	13
`igmp-immediate-leave`	Enables the immediate leave function for IGMP snooping. You must enable IGMP snooping as well.	C	13
`no igmp-immediate-leave`	Disables the immediate leave function for IGMP snooping.	C	13
`igmp-msg-limited`	Enables the IGMP message limit for IGMP snooping.	C	13
`igmp-msg-limited number <0~255>`	Sets the maximum number of multicast frames this port is allowed to flow through.	C	13
`no igmp-msg-limited`	Enables the IGMP message limiting feature for IGMP snooping.	C	13
`igmp-querier-mode <auto|fixed|edge>`	Specifies whether or not and under what conditions the port(s) is (are) IGMP query port(s). The Switch forwards IGMP join or leave frames to an IGMP query port, treating the port as being connected to an IGMP multicast router (or server). You must enable IGMP snooping as well. `fixed`: The Switch always treats the port(s) as IGMP query port(s). Select this when you connect an IGMP multicast server to the port(s). `auto`: The Switch uses the port as an IGMP query port if the port received IGMP query frames recently. An auto port doesn't forward any multicast group member information to its uplink router if the switch didn't receive any IGMP query frames from the router within a period. `edge`: The Switch does not use the port as an IGMP query port. The Switch does not keep any record of an IGMP router being connected to this port. The Switch does not forward IGMP join or leave frames to this port.	C	13

25.2 Command Examples

This example enables IGMP snooping on the Switch, sets the `host-timeout` and `leave-timeout` values to 30 seconds, and sets the Switch to drop frames from unknown multicast groups.

```
sysname(config)# igmp-snooping
sysname(config)# igmp-snooping host-timeout 30
sysname(config)# igmp-snooping leave-timeout 30
sysname(config)# igmp-snooping unknown-multicast-frame drop
```

In this example, port 1 can join up to five multicast groups.

```
sysname# configure
sysname(config)# igmp-snooping
sysname(config)# interface port-channel 1
sysname(config-interface)# igmp-group-limited
sysname(config-interface)# igmp-group-limited number 5
sysname(config-interface)# exit
sysname(config)# exit
sysname# show interfaces config 1 igmp-group-limited
  Port          Enable          Max Multicast Group
   1              YES                5
```

This example displays the global IGMP snooping settings.

This command output may vary depending on the device model.

```
sysname# show igmp-snooping
  IGMP Snooping                :Enable
  802.1P Priority              : 1
  Host Timeout                 : 260
  Leave Timeout                : 2
  Unknown Multicast Frame      :Flooding
  Reserved Multicast Frame     :Flooding
```

The following table describes the labels in this screen.

Table 65 show igmp-snooping

LABEL	DESCRIPTION
IGMP Snooping	Displays whether IGMP snooping is enabled or disabled currently.
802.1P Priority	Displays whether the Switch changes the priority before forwarding the IGMP snooping control frames to uplink port(s). **No Changed** displays if you want to keep the original frames' priorities. **0**~**7** displays if you want to change the original frames' priorities to the priority level (**0** is the lowest and **7** is the highest).

Table 65 show igmp-snooping (continued)

LABEL	DESCRIPTION
Host Timeout	Displays how many seconds to remove an IGMP group membership entry if the Switch does not receive any IGMP join reports from the host.
Leave Timeout	Displays how many seconds the Switch waits before removing an IGMP snooping membership entry when an IGMP leave report is received from a host. The Switch ignores this setting for the port on which you enable "Immediate Leave".
Unknown Multicast Frame	Displays the action to perform when the Switch receives a frame with a reserved multicast address. `flooding`: Sets this if you want the Switch to forward the frame to all ports. `drop`: Sets this if you want the Switch to drop the frame.
Reserved Multicast Frame	Displays the action to perform when the Switch receives an unknown multicast frame. `flooding`: Sets this if you want the Switch to forward the frame to all ports. `drop`: Sets this if you want the Switch to drop the frame.

This example displays the global IGMP proxy settings.

```
sysname# show igmp-proxy
  IGMP Proxy    :Enable

  IGMP Proxy Query Count :5
```

The following table describes the labels in this screen.

Table 66 show igmp-proxy

LABEL	DESCRIPTION
IGMP Proxy	Displays whether IGMP proxy is enabled or disabled currently.
IGMP Proxy Query Count	Displays the number of IGMP queries the Switch receives from its uplink port.

26

IGMP Filtering Commands

Use these commands to configure IGMP filters and IGMP filtering on the Switch. IGMP filtering limits the IGMP groups a subscriber on a port can join. See other IGMP related terms in the Chapter 25 on page 101.

26.1 Command Summary

The following section lists the commands for this feature.

Table 67 igmp-filtering Command Summary

COMMAND	DESCRIPTION	M	P
`show igmp-filtering profile [<name>|all]`	Displays IGMP filtering profile settings for the specified profile or for all profiles.	E	13
`igmp-filtering`	Enables IGMP filtering on the Switch. Ports can only join multicast groups specified in their IGMP filtering profile.	C	13
`no igmp-filtering`	Disables IGMP filtering on the Switch.	C	13
`igmp-filtering profile <name> start-address <ip-address> end-address <ip-address>`	Sets the range of multicast address(es) in a profile. *name*: 1-32 alphanumeric characters	C	13
`no igmp-filtering profile <name>`	Removes the specified IGMP filtering profile. You cannot delete an IGMP filtering profile that is assigned to any ports.	C	13
`no igmp-filtering profile <name> start-address <ip-address> end-address <ip-address>`	Clears the specified rule of the specified IGMP filtering profile.	C	13
`show interfaces config <port-list> igmp-filtering`	Displays IGMP filtering settings.	E	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`igmp-filtering profile <name>`	Assigns the specified IGMP filtering profile to the port(s). If IGMP filtering is enabled on the Switch, the port(s) can only join the multicast groups in the specified profile.	C	13
`no igmp-filtering profile`	Prohibits the port(s) from joining any multicast groups if IGMP filtering is enabled on the Switch.	C	13

26.2 Command Examples

This example restricts ports 1-4 to multicast IP addresses 224.255.255.0 through 225.255.255.255.

```
sysname# configure
sysname(config)# igmp-filtering
sysname(config)# igmp-filtering profile example1 start-address
--> 224.255.255.0 end-address 225.255.255.255
sysname(config)# interface port-channel 1-4
sysname(config-interface)# igmp-filtering profile example1
sysname(config-interface)# exit
sysname(config)# exit
```

27

Ingress Check Commands

Use these commands to configure ingress checking on the Switch.

27.1 Command Summary

The following section lists the commands for this feature.

Table 68 ingress-check Command Summary

COMMAND	DESCRIPTION	M	P
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`ingress-check`	Enables the ingress check on the specified port(s).	C	13
`no ingress-check`	Disables the ingress check on the specified port(s).	C	13

28

Interface Commands

Use these commands to configure basic port settings.

28.1 Command Summary

The following section lists the commands for this feature.

Table 69 interface Command Summary

COMMAND	DESCRIPTION	M	P
`clear interface <port-number>`	Clears all statistics for the specified port.	E	13
`show interface <port-number>`	Displays the current interface status.	E	13
`show interfaces <port-list>`	Displays the current interface status for the specified port(s).	E	13
`no interface <port-number>`	Clears all statistics for the specified port.	C	13
`show interfaces config <port-list>`	Displays current interface configuration.	E	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`bpdu-control <peer|tunnel|discard|network>`	Sets how Bridge Protocol Data Units (BPDUs) are used in STP port states.	C	13
`frame-type <all|tagged|untagged>`	Choose to accept tagged and/or untagged incoming frames on a port.	C	13
`ge-spq <q0~q7>`	Enables Strict Priority Queuing and specifies a queue on the gigabit Ethernet (10/100/1000 Mbps) ports.	C	13
`no ge-spq`	Disables Strict Priority Queuing on the gigabit Ethernet (10/100/1000 Mbps) ports.	C	13
`inactive`	Disables the specified port(s) on the Switch.	C	13
`no inactive`	Enables the port(s) on the Switch.	C	13
`name <port-name-string>`	Sets a name for the port(s). `<port-name-string>`: up to 9 English keyboard characters	C	13
`pvid <1~4094>`	The default PVID is VLAN 1 for all ports. Sets a PVID in the range 1 to 4094 for the specified interface.	C	13
`speed-duplex <auto|10-half|10-full|100-half|100-full|1000-full>`	Sets the duplex mode (`half` or `full`) and speed (`10`, `100` or `1000` Mbps) of the connection on the interface. Select `auto` (auto-negotiation) to let the specified port(s) negotiate with a peer to obtain the connection speed and duplex mode.	C	13
`flow-control`	Enables interface flow control. Flow control regulates transmissions to match the bandwidth of the receiving port.	C	13

Table 69 interface Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no flow-control`	Disables flow control on the port(s).	C	13
`qos priority <0~7>`	Sets the quality of service priority for an interface.	C	13
`test`	Runs an internal loopback test on the port(s).	C	13
`test <internal|external>`	Runs the specified interface loopback test.	C	13
`weight <wt1> <wt2> ... <wt8>`	Sets the queue weighting for weighted round robin (WRR) and weighted fair scheduling (WFS) on the specified port(s). *wt1, wt2, ..., wt8*: 1~15	C	13

28.2 Command Examples

This example looks at the current status of a VDSL port on VES-1624FA-54.

```
sysname# show interface 2
  Port Info     Port NO.                :2
                Link                    :100M/F
                Status                  :FORWARDING ( Copper )
                Up Time                 :0:47:00
                                          Up Stream / Down Stream
                Line Rate               :    18.855 /    57.121 Mbps
                Actual net data rate    :    18.738 /    56.898 Mbps
                SNR Margin              :      31.3 /      30.7 dB
                Actual delay            :       6.0 /       6.0 ms
                Tx Power                :       9.0 /       8.3 dBm
                Rx Power                :       5.7 /       6.0 dBm
                Actual INP              :      20.0 /      20.0 symbols
                Attenuation             :       2.9 /       2.6 dB
                Attainable net data rate:    52.006 /    55.878 Mbps
                RS Correct              :         0 /         0
                RS Uncorrect            :         0 /         0
                ES                      :         0 /         0
                SES                     :         0 /         0
                UAS                     :         0 /         0
                CodeViolation(CRC)      :         0 /         0
                LACP                    :Disabled
                TxPkts                  :227048
                RxPkts                  :384273
                Errors                  :0
                Tx KBs/s                :0.273
                Rx KBs/s                :0.192
  VDSL Band Status
                    US0     US1     US2     US3     DS1     DS2     DS3
  SNR margin         NA  31.6dB  31.2dB      NA  30.7dB  30.7dB  30.6dB
  Signal Atten       NA   1.1dB   4.0dB      NA   0.6dB   0.8dB   9.8dB
  Line   Atten    2.4dB   1.3dB   4.1dB      NA   0.5dB   1.0dB   9.9dB
  Tx Power           NA  3.4dBm  7.6dBm      NA  3.3dBm  2.8dBm  4.4dBm
  Rx Power           NA  2.3dBm  3.6dBm      NA  2.7dBm  2.0dBm -5.4dBm
  TX Packet     Tx Packets              :227048
                Multicast               :195
                Broadcast               :1374
                Pause                   :0
                OutDiscards             :0
                Tagged                  :0
```

```
  RX Packet     Rx Packets              :384273
                Multicast               :19801
                Broadcast               :102121
                Pause                   :0
                InDiscards              :0
                Control                 :0
  TX Collison   Single                  :0
                Multiple                :0
                Excessive               :0
                Late                    :0
  Error Packet  RX CRC                  :0
                Length                  :0
                Runt                    :0
  Distribution  64                      :236999
                65 to 127               :55939
                128 to 255              :110902
                256 to 511              :28253
                512 to 1023             :9391
                1024 to 1518            :169855
                Giant                   :0
  VDSL Performance Data
                                                Vtuc /      Vtur
                LOFs                    :         0 /         0
                LOSs                    :         0 /         0
                LOLs                    :         0 /         0
                LPRs                    :         0 /         0
                C15MinsTimeElapsed      :       486 /       486
                Curr15MinLofs           :         0 /         0
                Curr15MinLoss           :         0 /         0
                Curr15MinLols           :         0 /         0
                Curr15MinLprs           :         0 /         0
                C1DayTimeElapsed        :      3378 /      3378
                Curr1DayLofs            :         0 /         0
                Curr1DayLoss            :         0 /         0
                Curr1DayLols            :         0 /         0
                Curr1DayLprs            :         0 /         0
sysname#
```

The following table describes the labels in this screen.

This command output result may vary depending on the Switch model. Not all the following fields your Switch displays.

You can also refer to part of the following description for the command to show the current status of an Ethernet port.

Table 70 show interface (VDSL port)

LABEL	DESCRIPTION
Port Info	
Port NO.	This field displays the port number you are viewing.
Link	This field displays the speed (either `10M` for 10 Mbps, `100M` for 100 Mbps or `1000M` for 1000 Mbps) and the duplex (`F` for full duplex or `H` for half duplex). This field displays `Down` if the port is not connected to any device.
Status	If STP (Spanning Tree Protocol) is enabled, this field displays the STP state of the port. If STP is disabled, this field displays `FORWARDING` if the link is up, otherwise, it displays `STOP`. It also shows the cable type (`Copper` or `Fiber`).
Up Time	This field shows the total amount of time the connection has been up.
Line Rate	This field displays the upstream/downstream transmission rate.
Actual net data rate (or Payload Rate)	This field displays the actual upstream/downstream data transmission rate.
SNR Margin	This field displays the upstream/downstream SNR (Signal-to-Noise Rate) margin.
Actual delay (or interleave delay)	This field displays the actual upstream/downstream transmission delay (in milliseconds).
Tx Power	This field displays the upstream/downstream transmission power of the line. It ranges from 0 to 25.5 dBm, with 0.1 dB steps for downstream. It ranges from 0 to 25.5 dBm, with 0.1 dB steps for upstream.
Rx Power	This field displays the upstream/downstream receiving power of the line. The range is from 0 to 25.5 dBm with 0.1 dB steps for both downstream and upstream.
Actual INP	This field displays the actual impulse noise protection (INP).
Attenuation	This field displays the upstream/downstream attenuation.
Attainable net data rate	This parameter indicates the maximum upstream/downstream net data rate currently attainable by the CO transmitter and the CPE receiver or by the CPE transmitter and the CO receiver.
RS Correct	This field displays the number of Reed-Solomon (RS) correct packets.
RS Uncorrect	This field displays the number of Reed-Solomon (RS) uncorrect packets.
ES	This displays port endpoint error seconds (ESs).
SES	This displays port endpoint severely error seconds (SESs).
UAS	This is a count of 1-second intervals for which the line is unavailable. Use this to define this line tolerance to allow how long for a period of Unavailable Seconds (UAS). Refer to ITU-T G997.1 chapter 7.2.1.1.5 for more detailed information.
CodeViolation(CRC) (or CRC Error)	This field displays a count of anomalies occurring in this line during an accumulation period.
LACP	This field shows if LACP is enabled on this port or not.
TxPkts	This field shows the number of transmitted frames on this port

Table 70 show interface (VDSL port) (continued)

LABEL	DESCRIPTION
RxPkts	This field shows the number of received frames on this port
Errors	This field shows the number of received errors on this port.
Tx KBs/s	This field shows the number kilobytes per second transmitted on this port.
Rx KBs/s	This field shows the number of kilobytes per second received on this port.
VDSL Band Status	The fields in this section display the status for upstream bands 0, 1, 2, 3 (**U0**, **U1**, **U2**, **U3**) and downstream bands 1, 2, 3 (**D1**, **D2**, **D3**).
SNR margin	This field displays signal-to-noise ratio margin for each upstream and downstream bands. **NA** displays when the band is not used.
Signal Atten	This field displays the signal attenuation status for each upstream and downstream bands. **NA** displays when the band is not used.
Line Atten	This field displays the line attenuation status for each upstream and downstream bands. **NA** displays when the band is not used.
Tx Power	This field displays the transmission power for each upstream and downstream bands. **NA** displays when the band is not used.
Rx Power	This field displays the receiving power for each upstream and downstream bands. **NA** displays when the band is not used.
Tx Packet	The following fields display detailed information about packets transmitted.
TX Packets	This field shows the number of good packets (unicast, multicast and broadcast) transmitted.
Multicast	This field shows the number of good multicast packets transmitted.
Broadcast	This field shows the number of good broadcast packets transmitted.
Pause	This field shows the number of 802.3x Pause packets transmitted.
OutDiscards	This field shows the number of outgoing packets discarded.
Tagged	This field shows the number of packets transmitted with a VLAN tag.
Rx Packet	The following fields display detailed information about packets received.
RX Packets	This field shows the number of good packets (unicast, multicast and broadcast) received.
Multicast	This field shows the number of good multicast packets received.
Broadcast	This field shows the number of good broadcast packets received.
Pause	This field shows the number of 802.3x Pause packets received.
InDiscards	This field shows the number of incoming packets discarded.
Control	This field shows the number of control packets received (including those with CRC errors) but it does not include the 802.3x Pause packets.
TX Collision	The following fields display information on collisions while transmitting.
Single	This is a count of successfully transmitted packets for which transmission is inhibited by exactly one collision.
Multiple	This is a count of successfully transmitted packets for which transmission was inhibited by more than one collision.
Excessive	This is a count of packets for which transmission failed due to excessive collisions. Excessive collision is defined as the number of maximum collisions before the retransmission count is reset.
Late	This is the number of times a late collision is detected, that is, after 512 bits of the packets have already been transmitted.
Error Packet	The following fields display detailed information about packets received that were in error.

Table 70 show interface (VDSL port) (continued)

LABEL	DESCRIPTION
RX CRC	This field shows the number of packets received with CRC (Cyclic Redundant Check) error(s).
Length	This field shows the number of packets received with a length that was out of range.
Runt	This field shows the number of packets received that were too short (shorter than 64 octets), including the ones with CRC errors.
Distribution	
64	This field shows the number of packets (including bad packets) received that were 64 octets in length.
65 to 127	This field shows the number of packets (including bad packets) received that were between 65 and 127 octets in length.
128 to 255	This field shows the number of packets (including bad packets) received that were between 128 and 255 octets in length.
256 to 511	This field shows the number of packets (including bad packets) received that were between 256 and 511 octets in length.
512 to 1023	This field shows the number of packets (including bad packets) received that were between 512 and 1023 octets in length.
1024 to 1518	This field shows the number of packets (including bad packets) received that were between 1024 and 1518 octets in length.
Giant	This field shows the number of packets dropped because they were bigger than the maximum frame size.
VDSL Performance Data	This section displays current VDSL performance measured at CO side (`Vtuc`) and CPE side (`Vtur`).
LOFs	This field displays the count of 1-second intervals containing one or more Loss of Framing (LOF) failures.
LOSs	This field displays the count of 1-second intervals containing one or more Loss of Signal (LOS) failures.
LOLs	This field displays the count of 1-second intervals containing one or more Loss Of Link (LOL) failures occurred.
LPRs	This field displays the count of 1-second intervals containing one or more PoweR (LPR) failures occurred.
BMIN	If the actual SNR falls below the minimum SNR, the DSL connection will be dropped and re-initialized. This field displays how many times the connection has been dropped due to the average SNR' falling below the specified minimum SNR.
BERR	This field displays how many times the connection has been dropped due to the CRC errors' being increasing for more than 30 consecutive seconds.
C15MinsTimeElapsed	This field displays how many seconds has elapsed currently in this 15-minute (900 seconds) time segment. The counter restarts to zero after entering the next time segment.
Curr15MinLofs	This field displays the count of 1-second intervals containing one or more LOF failures since the last 15 minute (900 seconds) time segment. The counter restarts to zero after the time segment elapses.
Curr15MinLoss	This field displays the count of 1-second intervals containing one or more LOS failures since the last 15 minute (900 seconds) time segment. The counter restarts to zero after the time segment elapses.
Curr15MinLols	This field displays the count of 1-second intervals containing one or more LOL failures occurred since the last 15 minute (900 seconds) time segment. The counter restarts to zero after the time segment elapses.

Table 70 show interface (VDSL port) (continued)

LABEL	DESCRIPTION
Curr15MinLprs	This field displays the count of 1-second intervals containing one or more LPR failures since the last 15 minute (900 seconds) time segment. The counter restarts to zero after the time segment elapses.
Curr15MinBMIN	This field displays how many times the connection has been dropped due to the average SNR' falling below the specified minimum SNR within the last 15 minute (900 second) time segment. The counter resets to zero after the time segment elapses.
Curr15MinBERR	This field displays how many times the connection has been dropped due to the CRC errors' being increasing for more than 30 consecutive seconds within the last 15 minute (900 second) time segment. The counter resets to zero after the time segment elapses.
C1DayTimeElapsed	This field displays how many seconds has elapsed currently in this 1-day (86400 seconds) time segment. The counter restarts to zero after entering the next time segment.
Curr1DayLofs	This field displays the count of 1-second intervals containing one or more LOF failures since the last 1-day period. The counter restarts to zero after the time segment elapses.
Curr1DayLoss	This field displays the count of 1-second intervals containing one or more LOS failures since the last 1-day time segment. The counter restarts to zero after the time segment elapses.
Curr1DayLols	This field displays the count of 1-second intervals containing one or more LOL failures occurred since the last 1-day period. The counter restarts to zero after the time segment elapses.
Curr1DayLprs	This field displays the count of 1-second intervals containing one or more LPR failures occurred since the last 1-day period. The counter restarts to zero after the time segment elapses.
Curr1DayBMIN	This field displays how many times the connection has been dropped due to the average SNR's falling below the specified minimum SNR within the last 1-day period. The counter resets to zero after the time segment elapses.
Curr1DayBERR	This field displays how many times the connection has been dropped due to the CRC errors being increasing for more than 30 consecutive seconds within the last 1-day period. The counter resets to zero after the time segment elapses.

This example configures ports 1, 3, 4, and 5 in the following ways:

1. Sets the IEEE 802.1p quality of service priority to four (4).
2. Sets the name "Test".
3. Sets the speed to 100 Mbps in half duplex mode.

```
sysname(config)# interface port-channel 1,3-5
sysname(config-interface)# qos priority 4
sysname(config-interface)# name Test
sysname(config-interface)# speed-duplex 100-half
```

This example sets the default port vlan-id to 200 for ports 1-5 and configures ports 1-5 to accept only tagged frames.

```
sysname (config)# interface port-channel 1-5
sysname (config-interface)# pvid 200
sysname (config-interface)# frame-type tagged
```

This example performs an internal loopback test on ports 1, 3, 4, and 5. The test result are all right.

```
sysname# configure
sysname(config)# interface port-channel 1,3-5
sysname(config-interface)# test
03. IS3: Testing MAC internal loopback on port  1 :Passed!
  VDSL Port 1 Test ok.

03. IS3: Testing MAC internal loopback on port  3 :Passed!
  VDSL Port 3 Test ok.

03. IS3: Testing MAC internal loopback on port  4 :Passed!
  VDSL Port 4 Test ok.

03. IS3: Testing MAC internal loopback on port  5 :Passed!
  VDSL Port 5 Test ok.
```

29

IP Commands

Use these commands to configure the default domain name server and to look at IP domains.

See Chapter 63 on page 239 for static route commands.

29.1 Command Summary

The following section lists the commands for this feature.

Table 71 ip Command Summary

COMMAND	DESCRIPTION	M	P
`show ip`	Displays current IP interfaces.	E	0
`ip inband address <ip-address> <mask>`	Sets the management IP address and subnet mask.	C	13
`ip inband default-gateway <ip-address>`	Sets the default gateway's IP address.	C	13
`ip inband client [release|renew]`	Sets the inband management interface as a DHCP client. Optionally, releases or renews the information provided by a DHCP server.	C	13
`no ip`	Clears the out-of-band management IP settings.	C	13
`no ip inband`	Sets the inband management IP address and subnet mask to the default values.	C	13
`ip mvid <vlan-id>`	Sets the management VLAN ID.	C	13
`ip name-server <ip-address>`	Sets the IP address of the domain name server.	C	13
`ip address <ip-address> <mask>`	Sets the management IP address and subnet mask for the out-of-band management port.	C	13
`ip address default-gateway <ip-address>`	Sets the default gateway's IP address for the out-of-band management port.	C	13
`ip outband address <ip-address> <mask>`	Sets the management IP address and subnet mask for the out-of-band management port.	C	13
`no ip outband`	Sets the management IP address and subnet mask for the out-of-band management port to the default values.	C	13

Table 72 tcp and udp Command Summary

COMMAND	DESCRIPTION	M	P
`show ip tcp`	Displays IP TCP information.	E	13
`show ip udp`	Displays IP UDP information.	E	13
`kick tcp <session-id>`	Disconnects the specified TCP session.	E	13

29.2 Command Examples

This example shows the TCP statistics and listener ports.

```
sysname# show ip tcp
( 1)tcpRtoAlgorithm              4     ( 2)tcpRtoMin                    0
( 3)tcpRtoMax           4294967295     ( 4)tcpMaxConn          4294967295
( 5)tcpActiveOpens               9     ( 6)tcpPassiveOpens             41
( 7)tcpAttemptFails              0     ( 8)tcpEstabResets              12
( 9)tcpCurrEstab                 7     (10)tcpInSegs                 6974
(11)tcpOutSegs                7969     (12)tcpRetransSegs              84
(14)tcpInErrs                    0     (15)tcpOutRsts                   2
    &TCB Rcv-Q Snd-Q Rcv-Wnd Snd-Wnd Local socket           Remote socket
   State
  f05ac8     0   620     128   64369  172.1.1.204:23        172.23.5.15:4153
    Estab
  efde88     0     0     128       1  0.0.0.0:23             0.0.0.0:0
    Listen (S)
  f05774     0     0   22400   63259  172.1.1.204:443       172.23.5.15:4146
    Estab
  f05304     0     0   22400   64411  172.1.1.204:443       172.23.5.15:4145
    Estab
  f05658     0     0   16384   20860  127.0.0.1:80           127.0.0.1:1034
    Estab
  f0553c     0     0   22400   16384  127.0.0.1:1034         127.0.0.1:80
    Estab
  f059ac     0     0   16384    1575  127.0.0.1:80           127.0.0.1:1035
    Estab
  f05890     0     0   22400   16384  127.0.0.1:1035         127.0.0.1:80
    Estab
  efe1dc     0     0   16384       1  0.0.0.0:80             0.0.0.0:0
    Listen (S)
  efeabc     0     0   22400       1  0.0.0.0:443            0.0.0.0:0
    Listen (S)
  efecf4     0     0     128       1  0.0.0.0:22             0.0.0.0:0
    Listen
  efdfa4     0     0   16384       1  0.0.0.0:21             0.0.0.0:0
    Listen
```

The following table describes the labels in this screen.

Table 73 show ip tcp

LABEL	DESCRIPTION
tcpRtoAlgorithm	This field displays the algorithm used to determine the timeout value that is used for retransmitting unacknowledged octets.
tcpRtoMin	This field displays the minimum timeout (in milliseconds) permitted by a TCP implementation for the retransmission timeout. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is rsre(3), an object of this type has the semantics of the LBOUND quantity described in RFC 793.
tcpRtoMax	This field displays the maximum timeout (in milliseconds) permitted by a TCP implementation for the retransmission timeout. More refined semantics for objects of this type depend upon the algorithm used to determine the retransmission timeout. In particular, when the timeout algorithm is rsre(3), an object of this type has the semantics of the UBOUND quantity described in RFC 793.
tcpMaxConn	This field displays the maximum number of TCP connections the Switch can support. If the maximum number is dynamic, this field displays -1.
tcpActiveOpens	This field displays the number of times TCP connections have made a direct transition to the SYN-SENT state from the CLOSED state.
tcpPassiveOpens	This field displays the number of times TCP connections have made a direct transition to the SYN-RCVD state from the LISTEN state.
tcpAttemptFails	This field displays the number of times TCP connections have made a direct transition to the CLOSED state from either the SYN-SENT state or the SYN-RCVD state, plus the number of times TCP connections have made a direct transition to the LISTEN state from the SYN-RCVD state.
tcpEstabResets	This field displays the number of times TCP connections have made a direct transition to the CLOSED state from either the ESTABLISHED state or the CLOSE-WAIT state.
tcpCurrEstab	This field displays the number of TCP connections for which the current state is either ESTABLISHED or CLOSE-WAIT.
tcpInSegs	This field displays the total number of segments received, including those received in error. This count includes segments received on currently established connections.
tcpOutSegs	This field displays the total number of segments sent, including those on current connections but excluding those containing only retransmitted octets.
tcpRetransSegs	This field displays the total number of TCP segments transmitted containing one or more previously transmitted octets.
tcpInErrs	This field displays the total number of segments received with error (for example, bad TCP checksums).
tcpOutRsts	This field displays the number of TCP segments sent containing the RST flag.
	This section displays the current TCP listeners.
&TCB	This field displays the process ID.
Rcv-Q	This field displays the items on the receive queue in this connection.
Snd-Q	This field displays the sequence number of the first unacknowledged segment on the send queue in this connection.
Rcv-Wnd	This field displays the receiving window size in this connection. It determines the amount of received data that can be buffered.

Table 73 show ip tcp (continued)

LABEL	DESCRIPTION
Snd-Wnd	This field displays the sending window size in this connection. It is offered by the remote device.
Local socket	This field displays the local IP address and port number in this TCP connection. In the case of a connection in the LISTEN state that is willing to accept connections for any IP interface associated with the node, the value is 0.0.0.0.
Remote socket	This field displays the remote IP address and port number in this TCP connection.
State	This field displays the status of the TCP connection. `Estab`: The Switch has established a connection with a remote device. `Listen`: The Switch is listening for a request.

This example shows the UDP statistics and listener ports.

```
sysname# show ip udp
( 1)udpInDatagrams              33     ( 2)udpNoPorts                9660
( 3)udpInErrors                  0     ( 4)udpOutDatagrams              0
    &UCB Rcv-Q  Local socket
  e8eb10     0  0.0.0.0:520
  e8eb6c     0  0.0.0.0:263
 1a6e088     0  0.0.0.0:161
  e8f1e4     0  0.0.0.0:1026
  e8ecdc     0  0.0.0.0:1025
  e8ec80     0  0.0.0.0:1024
  e8ec24     0  0.0.0.0:53
  e8ebc8     0  0.0.0.0:69
```

The following table describes the labels in this screen.

Table 74 show ip udp

LABEL	DESCRIPTION
udpInDatagrams	This field displays the total number of UDP datagrams delivered to UDP users.
udpNoPorts	This field displays the total number of received UDP datagrams for which there was no application at the destination port.
udpInErrors	This field displays the number of received UDP datagrams that could not be delivered for reasons other than the lack of an application at the destination port.
udpOutDatagrams	This field displays the total number of UDP datagrams sent by the Switch.
&UCB	This field displays the process ID.
Rcv-Q	This field displays the queue number of pending datagrams in this connection.
Local socket	This field displays the local IP address and port number for this UDP listener. In the case of a UDP listener that is willing to accept datagrams for any IP interface associated with the node, the value is 0.0.0.0.

This example displays the IP settings, clears the out-of-band management IP settings and then displays the IP settings again to see the result.

```
sysname# show ip
Out-of-band Management IP Address = 192.168.0.1
Management IP Address
     IP[192.168.0.1], Netmask[255.255.255.0], VID[0]
IP Interface
     IP[192.168.1.1], Netmask[255.255.255.0], VID[1]
sysname# config
sysname(config)# no ip
sysname(config)# exit
sysname# show ip
Out-of-band Management IP Address = 0.0.0.0
Management IP Address
     IP[0.0.0.0], Netmask[255.255.255.255], VID[0]
IP Interface
     IP[192.168.1.1], Netmask[255.255.255.0], VID[1]
sysname#
```

30

IPQoS Commands

Use these commands to configure IPQoS (Quality of Service) profiles on the Switch. Configure IPQoS on the Switch to group and prioritize application traffic in queues for downstream direction (toward CPE devices) and fine-tune network performance.

30.1 Command Summary

The following section lists the commands for this feature.

Table 75 ipqos Command Summary

COMMAND	DESCRIPTION	M	P
`interface port-channel <port-list> ipqos-profilename <name>`	Associates the specified port with an IPQoS profile. *name*: Enters a name of up to 31 English keyboard characters to identify the profile.	C	13
`ipqos-profile <name>`	Enters config-ipqos mode to configure QoS (Qulity of Service) profile setting for each queue. *name*: Enters a name of up to 31 English keyboard characters to identify the profile. At the time of writing, you can only configure the **DEFVAL** and **Disable** profiles.	C	13
`exit`	Exits config-ipqos mode.	C	13
`TrTCM-profile1 <name>`	Associates queue 1 with a pre-configured TrTCM profile.	C	13
`TrTCM-profile2 <name>`	Associates queue 2 with a pre-configured TrTCM profile.	C	13
`TrTCM-profile3 <name>`	Associates queue 3 with a pre-configured TrTCM profile.	C	13
`TrTCM-profile4 <name>`	Associates queue 4 with a pre-configured TrTCM profile.	C	13
`TrTCM-profile5 <name>`	Associates queue 5 with a pre-configured TrTCM profile.	C	13
`TrTCM-profile6 <name>`	Associates queue 6 with a pre-configured TrTCM profile.	C	13
`TrTCM-profile7 <name>`	Associates queue 7 with a pre-configured TrTCM profile.	C	13
`TrTCM-profile8 <name>`	Associates queue 8 with a pre-configured TrTCM profile.	C	13
`no ipqos-profile <name>`	Deletes a IPQoS profile.	C	13
`no trtcm-profile <name>`	Deletes a TrTCM profile.	C	13
`show ipqos-profile [name]`	Displays all IPQoS profiles or a specified IPQoS profile.	E	13
`show trtcm-profile [name]`	Displays all TrTCM (Two rate To Color Marker) profiles or a specified IPQoS profile.	E	13
`trtcm-profile <name>`	Enters config-trtcmprofile mode to configure a TrTCM profile.	C	13
`CBS <256~512,000>`	Sets the maximum packet size (in kbytes)	C	13
`CIR <64~102,400>`	Sets the maximum data rate (in kbps).	C	13

Table 75 ipqos Command Summary (continued)

COMMAND	DESCRIPTION	M	P
exit	Exits config-trtcmprofile mode.	C	13
PBS <256~512,000>	Sets the maximum packet size (in kbytes).	C	13
PIR <64~102,400>	Sets the maximum data rate (in kbps).	C	13

30.2 Command Examples

This example sets a TrTCM profile “test12” and applies it to queue 1 in the IPQoS profile “DEFVAL”.

```
sysname# configure
sysname(config)# trtcm-profile test12
sysname(config-trtcmprofile)# cbs 65536
sysname(config-trtcmprofile)# cir 131072
sysname(config-trtcmprofile)# pbs 65536
sysname(config-trtcmprofile)# pir 131072
sysname(config-trtcmprofile)# exit
sysname(config)# ipqos-profile DEFVAL
sysname(config-ipqos)# TrTCM-profile1 test12
sysname(config-ipqos)# exit
```

This example associates port 2 with the IPQoS profile “DEFVAL”.

```
sysname# configure
sysname(config)# interface port-channel 2 ipqos-profilename DEFVAL
```

31

IP Source Binding Commands

Use these commands to manage the bindings table for IP source guard.

31.1 Command Summary

The following section lists the commands for this feature.

Table 76 ip source binding Command Summary

COMMAND	DESCRIPTION	M	P
`show ip source binding [<mac-addr>] [...]`	Displays the bindings configured on the Switch, optionally based on the specified parameters.	E	3
`show ip source binding help`	Provides more information about the specified command.	E	3
`ip source binding <mac-addr> vlan <vlan-id> <ip> [interface port-channel <interface-id>]`	Creates a static binding for ARP inspection.	C	13
`no ip source binding <mac-addr> vlan <vlan-id>`	Removes the specified static binding.	C	13

31.2 Command Examples

This example shows the current binding table.

```
sysname# show ip source binding
        MacAddress        IpAddress         Lease           Type  VLAN   Port
  -----------------  ---------------  ------------  -------------  ----  ---
  Total number of bindings: 0
```

The following table describes the labels in this screen.

Table 77 show ip source binding

LABEL	DESCRIPTION
MacAddress	This field displays the source MAC address in the binding.
IpAddress	This field displays the IP address assigned to the MAC address in the binding.
Lease	This field displays how many days, hours, minutes, and seconds the binding is valid; for example, **2d3h4m5s** means the binding is still valid for 2 days, 3 hours, 4 minutes, and 5 seconds. This field displays **infinity** if the binding is always valid (for example, a static binding).

Table 77 show ip source binding (continued)

LABEL	DESCRIPTION
Type	This field displays how the switch learned the binding. **static**: This binding was learned from information provided manually by an administrator.
VLAN	This field displays the source VLAN ID in the binding.
Port	This field displays the port number in the binding. If this field is blank, the binding applies to all ports.

32

IPv6 Commands

32.1 IPv6 Overview

IPv6 (Internet Protocol version 6), is designed to enhance IP address size and features. The increase in IPv6 address size to 128 bits (from the 32-bit IPv4 address) allows up to 3.4 x 10^{38} IP addresses. At the time of writing, the Switch supports the following features.

- Static address assignment (see Section 32.1.1 on page 131) and stateless autoconfiguration (see Stateless Autoconfiguration on page 134)
- Neighbor Discovery Protocol (see Neighbor Discovery Protocol (NDP) on page 136)
- ICMPv6 (see ICMPv6 on page 135)
- IPv4/IPv6 dual stack; the Switch can run IPv4 and IPv6 at the same time.
- Multicast Listener Discovery (MLD) snooping and proxy (see Multicast Listener Discovery on page 136)

For more information on IPv6 addresses, refer to RFC 2460 and RFC 4291.

32.1.1 IPv6 Addressing

The 128-bit IPv6 address is written as eight 16-bit hexadecimal blocks separated by colons (:). This is an example IPv6 address `2001:0db8:1a2b:0015:0000:0000:1a2f:0000`.

IPv6 addresses can be abbreviated in two ways:

- Leading zeros in a block can be omitted. So `2001:0db8:1a2b:0015:0000:0000:1a2f:0000` can be written as `2001:db8:1a2b:15:0:0:1a2f:0`.
- Any number of consecutive blocks of zeros can be replaced by a double colon. A double colon can only appear once in an IPv6 address. So `2001:0db8:0000:0000:1a2f:0000:0000:0015` can be written as `2001:0db8::1a2f:0000:0000:0015`, `2001:0db8:0000:0000:1a2f::0015`, `2001:db8::1a2f:0:0:15` or `2001:db8:0:0:1a2f::15`.

32.1.2 IPv6 Terms

IPv6 Prefix and Prefix Length

Similar to an IPv4 subnet mask, IPv6 uses an address prefix to represent the network address. An IPv6 prefix length specifies how many most significant bits (start from the left) in the address compose the network address. The prefix length is written as "/x" where x is a number. For example,

```
2001:db8:1a2b:15::1a2f:0/32
```

means that the first 32 bits (`2001:db8`) is the subnet prefix.

IPv6 Subnet Masking

Both an IPv6 address and IPv6 subnet mask compose of 128-bit binary digits, which are divided into eight 16-bit blocks and written in hexadecimal notation. Hexadecimal uses four bits for each character (1 ~ 10, A ~ F). Each block's 16 bits are then represented by four hexadecimal characters. For example, FFFF:FFFF:FFFF:FFFF:FC00:0000:0000:0000.

The first 48 bits of the IPv6 subnet mask are for Internet routing or fixed for local address, the 49th to the 64th bits are for subnetting and the last 64 bits are for interface identifying. The 16 binary digits for subnetting allows an organization to set up to 65,535 individual subnets.

Interface ID

In IPv6, an interface ID is a 64-bit identifier. It identifies a physical interface (for example, an Ethernet port) or a virtual interface (for example, the management IP address for a VLAN). One interface should have a unique interface ID.

Link-local Address

A link-local address uniquely identifies a device on the local network (the LAN). It is similar to a “private IP address” in IPv4. You can have the same link-local address on multiple interfaces on a device. A link-local unicast address has a predefined prefix of fe80::/10. The link-local unicast address format is as follows.

Table 78 Link-local Unicast Address Format

1111 1110 10	0	Interface ID
10 bits	54 bits	64 bits

Global Address

A global address uniquely identifies a device on the Internet. It is similar to a “public IP address” in IPv4. A global unicast address starts with a 2 or 3. The global address format as follows.

Table 79 Global Address Format

001	Global ID	Subnet ID	Interface ID
3 bits	45 bits	16 bits	64 bits

The global ID is the network identifier or prefix of the address and is used for routing. This may be assigned by service providers.

The subnet ID is a number that identifies the subnet of a site.

Multicast Address

In IPv6, multicast addresses provide the same functionality as IPv4 broadcast addresses. Broadcasting is not supported in IPv6. A multicast address allows a host to send packets to all hosts in a multicast group.

Multicast scope allows you to determine the size of the multicast group. A multicast address has a predefined prefix of ff00::/8. The following table describes some of the predefined multicast addresses.

Table 80 Predefined Multicast Address

MULTICAST ADDRESS	DESCRIPTION
FF01:0:0:0:0:0:0:1	All hosts on a local node.
FF01:0:0:0:0:0:0:2	All routers on a local node.
FF02:0:0:0:0:0:0:1	All hosts on a local connected link.
FF02:0:0:0:0:0:0:2	All routers on a local connected link.
FF05:0:0:0:0:0:0:2	All routers on a local site.
FF05:0:0:0:0:0:1:3	All DHCP severs on a local site.

The following table describes the multicast addresses which are reserved and can not be assigned to a multicast group.

Table 81 Reserved Multicast Address

MULTICAST ADDRESS
FF00:0:0:0:0:0:0:0
FF01:0:0:0:0:0:0:0
FF02:0:0:0:0:0:0:0
FF03:0:0:0:0:0:0:0
FF04:0:0:0:0:0:0:0
FF05:0:0:0:0:0:0:0
FF06:0:0:0:0:0:0:0
FF07:0:0:0:0:0:0:0
FF08:0:0:0:0:0:0:0
FF09:0:0:0:0:0:0:0
FF0A:0:0:0:0:0:0:0
FF0B:0:0:0:0:0:0:0
FF0C:0:0:0:0:0:0:0
FF0D:0:0:0:0:0:0:0
FF0E:0:0:0:0:0:0:0
FF0F:0:0:0:0:0:0:0

Loopback

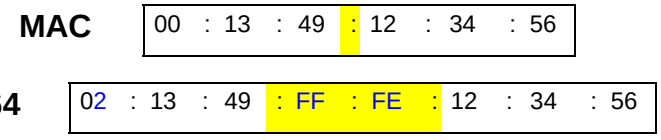
A loopback address (0:0:0:0:0:0:0:1 or ::1) allows a host to send packets to itself. It is similar to “127.0.0.1” in IPv4.

Unspecified

An unspecified address (0:0:0:0:0:0:0:0 or ::) is used as the source address when a device does not have its own address. It is similar to “0.0.0.0” in IPv4.

EUI-64

The EUI-64 (Extended Unique Identifier) defined by the IEEE (Institute of Electrical and Electronics Engineers) is an interface ID format designed to adapt with IPv6. It is derived from the 48-bit (6-byte) Ethernet MAC address as shown next. EUI-64 inserts the hex digits fffe between the third and fourth bytes of the MAC address and complements the seventh bit of the first byte of the MAC address. See the following example.



Stateless Autoconfiguration

With stateless autoconfiguration in IPv6, addresses can be uniquely and automatically generated. Unlike DHCPv6 (Dynamic Host Configuration Protocol version six) which is used in IPv6 stateful autoconfiguration, the owner and status of addresses don’t need to be maintained by a DHCP server. Every IPv6 device is able to generate its own and unique IP address automatically when IPv6 is initiated on its interface. It combines the prefix and the interface ID (generated from its own Ethernet MAC address, see Interface ID and EUI-64) to form a complete IPv6 address.

When IPv6 is enabled on a device, its interface automatically generates a link-local address (beginning with fe80).

When the interface is connected to a network with a router and the `ipv6 address autoconfig` command is issued on the Switch, it generates [1]another address which combines its interface ID and global and subnet information advertised from the router. This is a routable global IP address.

DHCPv6

The Dynamic Host Configuration Protocol for IPv6 (DHCPv6, RFC 3315) is a server-client protocol that allows a DHCP server to assign and pass IPv6 network addresses, prefixes and other configuration information to DHCP clients. DHCPv6 servers and clients exchange DHCP messages using UDP.

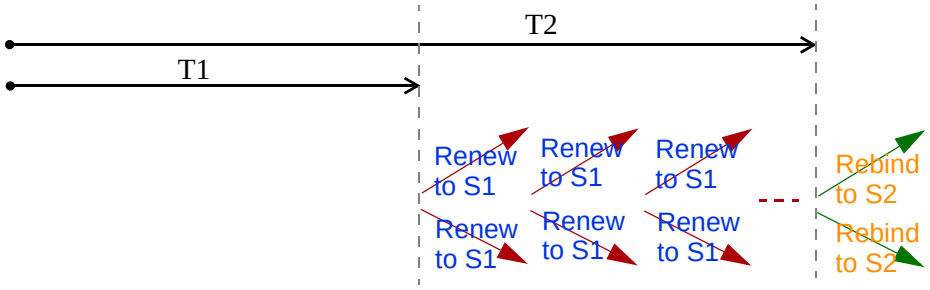
Each DHCP client and server has a unique DHCP Unique IDentifier (DUID), which is used for identification when they are exchanging DHCPv6 messages. The DUID is generated from the MAC address, time, vendor assigned ID and/or the vendor's private enterprise number registered with the IANA. It should not change over time even after you reboot the device.

1. In IPv6, all network interfaces can be associated with several addresses.

Identity Association

An Identity Association (IA) is a collection of addresses assigned to a DHCP client, through which the server and client can manage a set of related IP addresses. Each IA must be associated with exactly one interface. The DHCP client uses the IA assigned to an interface to obtain configuration from a DHCP server for that interface. Each IA consists of a unique IAID and associated IP information.

The IA type is the type of address in the IA. Each IA holds one type of address. IA_NA means an identity association for non-temporary addresses and IA_TA is an identity association for temporary addresses. An IA_NA option contains the T1 and T2 fields, but an IA_TA option does not. The DHCPv6 server uses T1 and T2 to control the time at which the client contacts with the server to extend the lifetimes on any addresses in the IA_NA before the lifetimes expire. After T1, the client sends the server (**S1**) (from which the addresses in the IA_NA were obtained) a Renew message. If the time T2 is reached and the server does not respond, the client sends a Rebind message to any available server (**S2**). For an IA_TA, the client may send a Renew or Rebind message at the client's discretion.



DHCP Relay Agent

A DHCP relay agent is on the same network as the DHCP clients and helps forward messages between the DHCP server and clients. When a client cannot use its link-local address and a well-known multicast address to locate a DHCP server on its network, it then needs a DHCP relay agent to send a message to a DHCP server that is not attached to the same network.

The DHCP relay agent can add the remote identification (remote-ID) option and the interface-ID option to the Relay-Forward DHCPv6 messages. The remote-ID option carries a user-defined string, such as the system name. The interface-ID option provides slot number, port information and the VLAN ID to the DHCPv6 server. The remote-ID option (if any) is stripped from the Relay-Reply messages before the relay agent sends the packets to the clients. The DHCP server copies the interface-ID option from the Relay-Forward message into the Relay-Reply message and sends it to the relay agent. The interface-ID should not change even after the relay agent restarts.

ICMPv6

Internet Control Message Protocol for IPv6 (ICMPv6 or ICMP for IPv6) is defined in RFC 4443. ICMPv6 has a preceding Next Header value of 58, which is different from the value used to identify ICMP for IPv4. ICMPv6 is an integral part of IPv6. IPv6 nodes use ICMPv6 to report errors encountered in packet processing and perform other diagnostic functions, such as "ping".

Neighbor Discovery Protocol (NDP)

The Neighbor Discovery Protocol (NDP) is a protocol used to discover other IPv6 devices and track neighbor's reachability in a network. A neighbor is "reachable" means a neighbor solicitation message (from the Switch) is responded with a neighbor advertisement message from the neighbor.

Multicast Listener Discovery

The Multicast Listener Discovery (MLD) protocol (defined in RFC 2710) is derived from IPv4's Internet Group Management Protocol version 2 (IGMPv2). MLD uses ICMPv6 message types, rather than IGMP message types. MLDv1 is equivalent to IGMPv2 and MLDv2 is equivalent to IGMPv3.

MLD allows an IPv6 switch or router to discover the presence of MLD hosts who wish to receive multicast packets and the IP addresses of multicast groups the hosts want to join on its network.

MLD snooping and MLD proxy are analogous to IGMP snooping and IGMP proxy in IPv4.

MLD filtering controls which multicast groups a port can join.

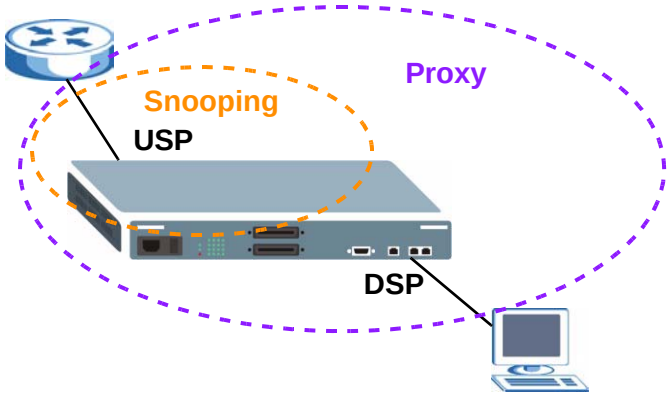
MLD Messages

A multicast router or switch periodically sends general queries to MLD hosts to update the multicast forwarding table. When an MLD host wants to join a multicast group, it sends an MLD Report message for that address.

An MLD Done message is equivalent to an IGMP Leave message. When an MLD host wants to leave a multicast group, it can send a Done message to the router or switch. If the leave mode is not set to `immediate`, the router or switch sends a group-specific query to the port on which the Done message is received to determine if other devices connected to this port should remain in the group.

MLD Port Role

A port on the Switch can be either a downstream port or upstream port in MLD. A downstream port (**DSP** in the figure) connects to MLD hosts and acts as a multicast router to send MLD queries and listen to the MLD host's Report and Done messages. An upstream port (**USP** in the figure) connects to a multicast router and works as a host to send Report or Done messages when receiving queries from a multicast router.



32.2 Command Summary

The following section lists the commands for this feature.

Table 82 ipv6 Command Summary

COMMAND	DESCRIPTION	M	P
`ip address ipv6 <ipv6-address/maskbits>`	Manually configures a static out-of-band management IPv6 global address.	C	13
`ip address default-gateway ipv6 <ipv6-address>`	Manually configures a static out-of-band IPv6 global address for the default outgoing gateway.	C	13
`ip ipv6 default-gateway <ipv6-address>`	Manually configures a static in-band IPv6 global address for the default outgoing gateway.	C	13
`ip ipv6 inband-default <ipv6-address/maskbits>`	Manually configures a static in-band management IPv6 global address.	C	13
`no ipv6 in-band`	Removes the manually configured in-band management IPv6 address and default gateway address.	C	13
`no ipv6 out-of-band`	Removes the manually configured out-of-band management IPv6 address and default gateway address.	C	13
`show ip ipv6`	Displays the link-local addresses the Switch generated automatically. This also shows the manually configured in-band/out-of-band management IPv6 address and default gateway address.	E	3
`show ip ipv6 default-router`	Displays IPv6 addresses of on-link routers that will help forward packets.	E	3
`show ip ipv6 destination`	Displays the mapping list of the next-hop address to an IPv6 destination address.	E	3
`show ip ipv6 neighbor`	Displays the neighbor cache, which lists the MAC addresses of the Switch's interfaces and neighboring devices.	E	3
`show ip ipv6 prefix`	Displays the the list of on-link prefixes. The prefixes are used to determine whether an IP address is on the same link as the Switch or should be reached through a router. A prefix is considered to be on-link when it is assigned to an interface on a link. It's used to determine if an address is on the Switch's subnet and can be reached directly without passing through a router. An on-link interface is directly connected to the Switch or connected through another switch.	E	3
`show ip ipv6 route`	Displays the IPv6 routing table.	E	3

32.3 Command Examples

This example displays the link-local addresses the Switch automatically generated for the in-band and out-of-band management interfaces.

```
sysname# show ip ipv6
In-band IPv6 Link-local Address = fe80::219:cbff:fe00:2
Out-of-band IPv6 Link-local Address = fe80::219:cbff:fe00:1
In-band Management
     IP Address[::]
     Default Netmask[::]
     Default gateway[::]
Out-of-band Management
     IP Address[::]
     Default Netmask[::]
     Default gateway[::]
sysname#
```

This example shows how to manually configure an IPv6 in-band management address, and then displays the result.

```
sysname# config
sysname(config)# ip ipv6 inband-default 2001:db8:c18:1::12b/64
sysname(config)# exit
sysname# show ip ipv6
In-band IPv6 Link-local Address = fe80::219:cbff:fe00:2
Out-of-band IPv6 Link-local Address = fe80::219:cbff:fe00:1
In-band Management
     IP Address[2001:db6:c18:1::12b]
     Default Netmask[ffff:ffff:ffff:ffff::]
     Default gateway[::]
Out-of-band Management
     IP Address[::]
     Default Netmask[::]
     Default gateway[::]
sysname#
```

This example shows the link-layer addresses of the Switch's interfaces or a neighbor which is reachable from the Switch.

```
sysname# show ip ipv6 neighbor

Interface: In-band
  Neighbor                                Linklayer Address Expire    Flags
  --------------------------------------- ----------------- --------- --------
  fe80::219:cbff:fe00:2                   00:19:cb:00:00:02 permanent Reachable

Interface: Out-of-band
  Neighbor                                Linklayer Address Expire    Flags
  --------------------------------------- ----------------- --------- --------
  fe80::219:cbff:fe00:1                   00:19:cb:00:00:01 permanent Reachable
  Flags-state: "Incomplete", "Reachable", "Stale", "Delay",
               "Probe", "Invalid", "Unknown"
  Flags-IsRouter: "(R)"
sysname#
```

The following table describes the labels in this screen.

Table 83 show ipv6 neighbor

LABEL	DESCRIPTION
`Interface`	This is the interface on which the IPv6 address is created or through which a neighbor can be reached.
`Neighbor`	This is the IPv6 address of the Switch's interface or a neighboring device.
`Linklayer Address`	This is the MAC address of the interface on which the IPv6 address is configured.
`Expire`	This displays how long (*hh*h*mm*m*ss*s) an address can be used before it expires. If an address is manually configured, it displays `permanent` (never expires).
`Flags`	This field displays whether the neighboring IPv6 interface is reachable. In IPv6, "reachable" means an IPv6 packet can be correctly forwarded to a neighboring node (host or router) and the neighbor can successfully receive and handle the packet. The available options in this field are: • `Reachable`: The interface of the neighboring device is reachable. (The Switch has received a response to its neighbor solicitation.) • `Stale`: The last reachable time has expired or the Switch received an unrequested advertisement that updates the cached link-layer address from the neighboring interface. • `Delay`: A packet is being sent to the neighboring interface in Stale state.The Switch delays sending request packets for a short time to give upper-layer protocols a chance to determine reachability. If no reachability confirmation is received within the delay timer, the Switch sends a neighbor solicitation and changes the state to Probe. • `Probe`: The Switch is sending neighbor solicitations and waiting for the neighbor's response. • `Invalid`: The neighbor address is an invalid IPv6 address. • `Unknown`: The status of the neighboring interface can not be determined. • `Incomplete`: Address resolution is in progress and the link-layer address of the neighbor has not yet been determined (see RFC 4861). The interface of the neighboring device did not give a complete response. • `R`: The neighboring device is a router.

32.4 Example - Enabling IPv6 on Windows XP/2003

By default, Windows XP and Windows 2003 support IPv6. This example shows you how to use the `ipv6 install` command on Windows XP/2003 to enable IPv6. This also displays how to use the `ipconfig` command to see auto-generated IP addresses.

```
C:\>ipv6 install
Installing...
Succeeded.

C:\>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 10.1.1.46
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        IP Address. . . . . . . . . . . . : fe80::2d0:59ff:feb8:103c%4
        Default Gateway . . . . . . . . . : 10.1.1.254

Tunnel adapter Teredo Tunneling Pseudo-Interface:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : fe80::5445:5245:444f%5
        Default Gateway . . . . . . . . . :

Tunnel adapter Automatic Tunneling Pseudo-Interface:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : fe80::5efe:10.1.1.46%2
        Default Gateway . . . . . . . . . :
```

IPv6 is installed and enabled by default in Windows Vista. Use the “ipconfig” command to check your automatic configured IPv6 address as well. You should see at least one IPv6 address available for the interface on your computer.

32.5 Example - HTTP Accessing the Switch Using IPv6

How you access the Switch using HTTP varies depending on the operating system (OS) and the type of browser you use and the type of address you want to access.

It's recommended to use Internet Explorer 7.0 or FireFox to access the Switch's web GUI.

Table 84 Specifying the Switch Address for HTTP Access

OS	DESTINATION	INTERNET EXPLORER 7.0	FIREFOX
Windows XP	A link-local address	Use http://*address* The address should be converted using the following procedure. 1. Use a dash "-" to replace each colon ":" in an IPv6 address. 2. Append the Ethernet interface identifier you want to use to connect to the Switch. But replace the percentage character "%" with "s". 3. Append ".ipv6-literal.net" at the end. For example, the Switch uses an address fe80::1234:5678. The Ethernet interface identifier you want to use on your computer to access the Switch is %4. You have to type the following to access the Switch. http://fe80--1234-5678-1s4.ipv6-literal.net.	
	A global address	Use http://[*address*] For example, http://[fe80--1234-5678-1]	
Windows Vista	A link-local address		
	A global address		

This example shows you how to access the Switch using HTTP on Windows XP.

1. Make sure you have enabled IPv6 on your computer (see Section 32.4). Use the `ipconfig` command in the command prompt to check the IPv6 address on your computer. The example uses an interface with address "fe80::2d0:59ff:feb8:103c" to access the Switch. So its Ethernet interface identifier is %4 and will be used later to make a ping.

```
C:\>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 10.1.1.46
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        IP Address. . . . . . . . . . . . : fe80::2d0:59ff:feb8:103c%4
        Default Gateway . . . . . . . . . : 10.1.1.254
```

2. Check the Switch IPv6 address(es) you want to ping. In this example, there are two link-local IPv6 addresses and one global address on the Switch. One is the in-band link-local

address (fe80::219:cbff:fe00:2), one is the out-of-band link-local address (fe80::219:cbff:fe00:1) and the other one is the in-band global address (2001::1234).

```
sysname# show ip ipv6
In-band IPv6 Link-local Address = fe80::219:cbff:fe00:2
Out-of-band IPv6 Link-local Address = fe80::219:cbff:fe00:1
In-band Management
     IP Address[2001::1234]
     Default Netmask[ffff:ffff:ffff:ffff::]
     Default gateway[::]
Out-of-band Management
     IP Address[::]
     Default Netmask[::]
     Default gateway[::]
sysname#
```

3 In order to access the Switch through its out-of-band link-local address, do the address convertion (See Table 84 on page 141).

3a Use a dash “-” to replace each colon “:” in an IPv6 address. Then the address becomes:

fe80--219-cbff-fe00-1

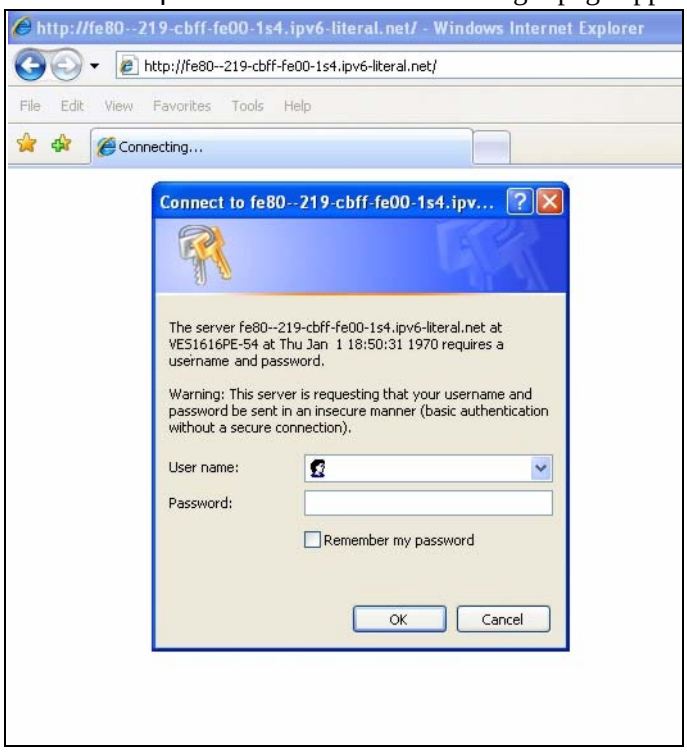
3b In the step 1, the Ethernet interface identifier you want to use to connect to the Switch is “%4”. Replace the percentage character “%” with “s” and then append it to the address. The address becomes:

fe80--219-cbff-fe00-1s4

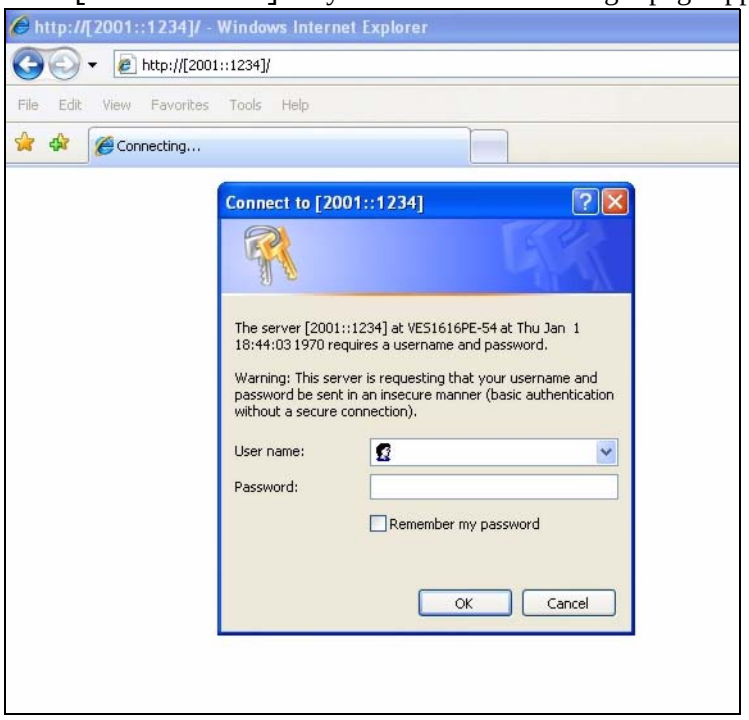
3c Append “.ipv6-literal.net” at the end. The address becomes:

fe80--219-cbff-fe00-1s4.ipv6-literal.net

Open an Internet Explorer 7.0 browser and type `http://fe80--219-cbff-fe00-1s4.ipv6-literal.net`. The login page appears.


http://fe80--219-cbff-fe00-1s4.ipv6-literal.net/ - Windows Internet Explorer
http://fe80--219-cbff-fe00-1s4.ipv6-literal.net/
File Edit View Favorites Tools Help
Connecting...
Connect to fe80--219-cbff-fe00-1s4.ipv...
The server fe80--219-cbff-fe00-1s4.ipv6-literal.net at VES1616PE-54 at Thu Jan 1 18:50:31 1970 requires a username and password.
Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).
User name:
Password:
Remember my password
OK
Cancel

4 Alternatively, you can use the global address to access the Switch. Type `http://[2001::1234]` on your browser and the login page appears.


http://[2001::1234]/ - Windows Internet Explorer
http://[2001::1234]/
File Edit View Favorites Tools Help
Connecting...
Connect to [2001::1234]
The server [2001::1234] at VES1616PE-54 at Thu Jan 1 18:44:03 1970 requires a username and password.
Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).
User name:
Password:
Remember my password
OK
Cancel

33

Layer 2 Protocol Tunnel (L2PT) Commands

33.1 Command Summary

The following section lists the commands for this feature.

Table 85 l2pt Command Summary

COMMAND	DESCRIPTION	M	P
`clear l2protocol-tunnel`	Removes all layer 2 protocol tunneling counters.	E	13
`interface port-channel <port-list>`	Enters config-interface mode for configuring the specified port(s).	C	13
`l2protocol-tunnel`	Enables layer 2 protocol tunneling for CDP (Cisco Discovery Protocol), STP (Spanning Tree Protocol) and VTP (VLAN Trunking Protocol) packets on the specified port(s).	C	13
`l2protocol-tunnel cdp`	Enables layer 2 protocol tunneling for CDP packets on the specified port(s).	C	13
`l2protocol-tunnel mode <access|tunnel>`	Sets the L2PT mode for the specified port(s) `access`: for ingress ports at the edge of the service provider's network. The Switch encapsulates the incoming layer 2 protocol packets and forward them to the tunnel port(s). Note: You can enable L2PT services for STP, LACP, VTP, CDP, UDLD, and PAGP on the access port(s) only. `tunnel`: for egress ports at the edge of the service provider's network. The Switch decapsulates the encapsulated layer 2 protocol packets received on a tunnel port by changing the destination MAC adress to the original one, and then forward them to an access port. If the service(s) is not enabled on an access port, the protocol packets are dropped.	C	13
`l2protocol-tunnel point-to-point`	Enables point-to-point layer 2 protocol tunneling for LACP (Link Aggregation Control Protocol), PAgP (Port Aggregation Protocol) and UDLD (UniDirectional Link Detection) packets on the specified port(s).	C	13
`l2protocol-tunnel point-to-point lacp`	Enables point-to-point layer 2 protocol tunneling for LACP packets on the specified port(s).	C	13
`l2protocol-tunnel point-to-point pagp`	Enables point-to-point layer 2 protocol tunneling for PAgP packets on the specified port(s).	C	13

Table 85 l2pt Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`l2protocol-tunnel point-to-point udld`	Enables point-to-point layer 2 protocol tunneling for UDLD packets on the specified port(s).	C	13
`l2protocol-tunnel stp`	Enables layer 2 protocol tunneling for STP packets on the specified port(s).	C	13
`l2protocol-tunnel vtp`	Enables layer 2 protocol tunneling for CDP packets on the specified port(s).	C	13
`no l2protocol-tunnel`	Disables layer 2 protocol tunneling for CDP, VTP and STP packets on the specified port(s).	C	13
`no l2protocol-tunnel cdp`	Disables layer 2 protocol tunneling for CDP packets on the specified port(s).	C	13
`no l2protocol-tunnel point-to-point`	Disables point-to-point layer 2 protocol tunneling for LACP, PAgP and UDLD packets on the specified port(s).	C	13
`no l2protocol-tunnel point-to-point lacp`	Disables point-to-point layer 2 protocol tunneling for LACP packets on the specified port(s).	C	13
`no l2protocol-tunnel point-to-point pagp`	Disables point-to-point layer 2 protocol tunneling for PAgP packets on the specified port(s).	C	13
`no l2protocol-tunnel point-to-point udld`	Enables point-to-point layer 2 protocol tunneling for UDLD packets on the specified port(s).	C	13
`no l2protocol-tunnel stp`	Disables layer 2 protocol tunneling for STP packets on the specified port(s).	C	13
`no l2protocol-tunnel vtp`	Disables layer 2 protocol tunneling for VTP packets on the specified port(s).	C	13
`l2protocol-tunnel`	Enables layer 2 protocol tunneling on the Switch.	C	13
`l2protocol-tunnel mac <mac-addr>`	Sets the destination MAC address used for encapsulating layer 2 protocol packets received on an access port.	C	13
`no l2protocol-tunnel`	Disables layer 2 protocol tunneling on the Switch.	C	13
`show l2protocol-tunnel`	Displays layer 2 protocol tunneling settings and counters for all ports.	E	13
`show l2protocol-tunnel interface port-channel <port-list>`	Displays layer 2 protocol tunneling settings and counters for the specified port(s).	E	13

33.2 Command Examples

This example enables L2PT on the Switch and sets the destination MAC address for encapsulating layer 2 protocol packets received on an access port.

```
sysname# configure
sysname(config)# l2protocol-tunnel
sysname(config)# l2protocol-tunnel mac 00:10:23:45:67:8e
sysname(config)#
```

This example enables L2PT for STP, CDP and VTP packets on port 3. It also sets L2PT mode to **access** for this port.

```
sysname(config)# interface port-channel 3
sysname(config-interface)# l2protocol-tunnel
sysname(config-interface)# l2protocol-tunnel mode access
sysname(config-interface)# exit
sysname(config)# exit
```

This example sets L2PT mode to **tunnel** for port 4.

```
sysname(config)# interface port-channel 4
sysname(config-interface)# l2protocol-tunnel mode tunnel
sysname(config-interface)# exit
sysname(config)# exit
```

This example displays L2PT settings and status on port 3. You can also see how many CDP, STP, VTP, LACP, PAgP and UDLD packets received on this port are encapsulated, decapsulated or dropped.

```
sysname# show l2protocol-tunnel interface port-channel 3

Status : Running
Layer 2 Protocol Tunneling: Enable
Destination MAC Address: 00:10:23:45:67:8e

Port  Protocol   State  Encapsulation  Decapsulation     Drop
                            Counter        Counter  Counter
----  --------  ------  -------------  -------------  -------
   3       cdp  Enable              0              0        0
            stp  Enable           1280           2548        0
            vtp  Enable              0              0        0
           lacp  Disable             0              0        0
           pagp  Disable             0              0        0
           udld  Disable             0              0        0
sysname#
```

34

LACP Commands

Use these commands to configure Switch settings for LACP (Link Aggregate Control Protocol).

34.1 Command Summary

The following section lists the commands for this feature.

Table 86 lacp Command Summary

COMMAND	DESCRIPTION	M	P
`show lacp`	Displays LACP (Link Aggregation Control Protocol) settings.	E	13
`lacp`	Enables Link Aggregation Control Protocol (LACP).	C	13
`lacp daisy-chain`	Sets the Switch to process and copy all downstream traffic received on the uplink port to another Gigabit Ethernet port. All upstream traffic received on the Gigabit Ethernet port is also copied to the uplink port, but the Switch does not process the upstream traffic.	C	13
`lacp port-selection <1:SA|2:DA|3:SA+DA|4:SIP|5:DIP|6:SIP+DIP>`	Specify the way to choose a port in the trunk group (multiple ports) to transmit/receive packets for different type of traffic. Select one of the following criteria for the port selection. SA (source MAC address): Uses packets' source MAC address as the criteria. DA (destination MAC address): Uses packets' destination MAC address as the criteria. SA+DA (source+destination MAC address): Uses packets' both source and destination MAC address as the criteria. SIP (source IP address): Uses packets' source IP address as the criteria. This can be only used for IPv4 packets. DIP (destination IP address): Uses packets' destination IP address as the criteria. This can be only used for IPv4 packets. SIP+DIP (source+destination IP address): Uses packets' both source and destination IP address as the criteria.	C	13
`lacp system-priority <1-65535>`	Sets the priority of an active port using LACP.	C	13
`no lacp`	Disables the link aggregation control protocol (dynamic trunking) on the Switch.	C	13
`no lacp daisy-chain`	Disables daisy-chain mode.	C	13

34.2 Command Examples

This example shows the current LACP settings.

```
sysname# show lacp
AGGREGATOR INFO:
ID: 1
  [(0000,00-00-00-00-00-00,0000,00,0000)][(0000,00-00-00-00-00-00,
--> 0000,00,0000)]
LINKS :
SYNCS :
```

The following table describes the labels in this screen.

Table 87 show lacp

LABEL	DESCRIPTION
ID	This field displays the trunk ID to identify a trunk group, that is, one logical link containing multiple ports.
[(0000,00-00-00-00-00-00,0000,00,0000)]	This field displays the system priority, MAC address, key, port priority, and port number.
LINKS	These are the ports that are in the trunk group.
SYNCS	These are the ports that are currently transmitting data as one logical link in this trunk group.

This example sets to use packets' source IP address for the LACP port selection criteria.

```
sysname# config
sysname(config)# lacp port-selection ?
     <1:SA|2:DA|3:SA+DA|4:SIP|5:DIP|6:SIP+DIP>
sysname(config)# lacp port-selection 4
```

35

Login Account Commands

Use these commands to configure login accounts on the Switch.

35.1 Command Summary

The following section lists the commands for this feature.

Table 88 logins Command Summary

COMMAND	DESCRIPTION	M	P
`show logins`	Displays login account information.	E	13
`logins username <name> password <pwd>`	Creates an account with the specified user name and sets the password. <*name*>: 1-32 alphanumeric characters <*pwd*>: 1-32 alphanumeric characters	C	14
`logins username <name> password <pwd> index <1~4>`	Creates an account with the specified user name and sets the password and priority (1~4). Set the index to 1 to have the highest priority than other accounts.	C	14
`logins username <name> privilege <0~14>`	Assigns a privilege level to the specified account. The privilege level is applied the next time the user logs in.	C	14
`no logins username <name>`	Removes specified account.	C	14

35.2 Command Examples

This example creates a new user user2 with privilege 13.

```
sysname# configure
sysname(config)# logins username user2 password 1234
sysname(config)# logins username user2 privilege 13
sysname(config)# exit
sysname# show logins
Login   Username        Privilege
0       user2           13
1                       0
2                       0
3                       0
```

36

Login Precedence Commands

Use these commands to configure the login precedence for the Switch.

36.1 Command Summary

The following section lists the commands for this feature.

Table 89 loginPrecedence Command Summary

COMMAND	DESCRIPTION	M	P
`show loginPrecedence`	Displays login precedence settings.	E	14
`loginPrecedence <LocalOnly|LocalRADIUS|RADIUSOnly>`	Sets the login precedence.	C	14

37

Loopguard Commands

Use these commands to configure the Switch to guard against loops on the edge of your network. The Switch shuts down a port if the Switch detects that packets sent out on the port loop back to the Switch.

37.1 Command Summary

The following section lists the commands for this feature.

Table 90 loopguard Command Summary

COMMAND	DESCRIPTION	M	P
`show loopguard`	Displays whether loop guard is enabled or disabled and packet statistics on each ports.	E	13
`loopguard`	Enables loop guard on the Switch.	C	13
`no loopguard`	Disables loop guard on the Switch.	C	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`loopguard`	Enables loop guard on the port(s). You have to enable loopguard on the Switch as well. The Switch shuts down a port if the Switch detects that packets sent out on the port loop back to the Switch. Note: The loop guard feature can not be enabled on the ports that have Spanning Tree Protocol (RSTP, MRSTP or MSTP) enabled.	C	13
`loopguard mode <fix|dynamic>`	Sets the port mode for loop guard. `fix` : The Switch shuts down the port(s) if the Switch detects that packets sent out on the port(s) loop back to the Switch. To activate the port again, you need to manually enable the port(s) using the `interface port-channel <port-list> no inactive` command. `dynamic` : The Switch shuts down the port(s) if the Switch detects that packets sent out on the port(s) loop back to the Switch. The port(s) becomes active automatically after the time you set using the `interface port-channel <port-list> loopguard recover-time <60~600>` command.	C	13
`loopguard recover-time <60~600>`	Sets the time (in seconds) the port(s) in dynamic mode waits to become active again after shut down by the Switch.	C	13
`no loopguard`	Disables loop guard on the port(s).	C	13

Table 90 loopguard Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no loopguard recover-time`	Removes the loop guard recovery time setting.	C	13
`clear loopguard`	Clears loop guard counters. You can view the counters using the `show loopguard` command.	E	13
`show loopguard port-mode`	Displays the loop guard mode of each port on the Switch.	E	13
`show loopguard port-recover-time`	Displays the loop guard recovery time for each port on the Switch.	E	13

37.2 Command Example

This example shows how to enable Loop Guard on port 2 and display the loop guard status on all ports.

```
sysname# configure
sysname(config)# interface port 2
sysname(config-interface)# loopguard
sysname(config-interface)# exit
sysname(config)# exit
sysname# show loopguard
  LoopGuard Status: Disable

  Port  Port      LoopGuard  Total     Total     Bad   Shutdown
  No    Status    Status     TxPkts    RxPkts    Pkts  Time
  ----  --------  ---------  --------  --------  ----  ----------------------
     1    Active    Disable         0         0     0   00:00:00 UTC Jan 1 1970
     2    Active     Enable         0         0     0   00:00:00 UTC Jan 1 1970
     3    Active    Disable         0         0     0   00:00:00 UTC Jan 1 1970
     4    Active    Disable         0         0     0   00:00:00 UTC Jan 1 1970
     5    Active    Disable         0         0     0   00:00:00 UTC Jan 1 1970
-----------------------------------SNIP-------------------------------------
```

38

MAC Address Commands

Use these commands to look at the MAC address table and to configure MAC address learning. The Switch uses the MAC address table to determine how to forward frames.

38.1 Command Summary

The following section lists the commands for this feature.

Table 91 mac, mac-aging-time, and mac-flush Command Summary

COMMAND	DESCRIPTION	M	P
`show mac-aging-time`	Displays MAC learning aging time.	E	13
`mac-aging-time <10-3000>`	Sets learned MAC aging time in seconds.	C	13
`show mac address-table all [<sort>]`	Displays MAC address table. You can sort by MAC address, vlan ID or port. *sort*: MAC, VID, or PORT.	E	13
`show mac address-table count`	Displays the total number of MAC addresses in the MAC address table.	E	13
`show mac address-table port <port-list> [<sort>]`	Displays the static MAC address table for the specified port(s). *sort*: MAC, VID, or PORT.	E	13
`show mac address-table static`	Displays the static MAC address table.	E	13
`show mac address-table vlan <vlan-id> [<sort>]`	Displays the static MAC address table for the specified VLAN. *sort*: MAC, VID, or PORT.	E	13
`mac-flush [port-num]`	Clears the MAC address table. Optionally, removes all learned MAC address on the specified port.	E	13

38.2 Command Examples

This example shows the current MAC address table.

```
sysname# show mac address-table all
Port      VLAN ID        MAC Address         Type
1         1              00:00:aa:10:05:87   Dynamic
1         1              00:00:aa:77:86:48   Dynamic
1         1              00:02:e3:57:ea:4f   Dynamic
1         1              00:04:80:9b:78:00   Dynamic
1         1              00:0f:fe:ad:58:ab   Dynamic
```

The following table describes the labels in this screen.

Table 92 show mac address-table

LABEL	DESCRIPTION
Port	This is the MAC address of the device from which this frame came.
VLAN ID	This is the VLAN group to which this frame belongs.
MAC Address	This is the port from which the above MAC address was learned.
Type	This shows whether the MAC address is `dynamic` (learned by the Switch) or `static` (manually entered using `mac-forward` commands, see Chapter 42 on page 165).

39

MAC Authentication Commands

Use these commands to configure MAC authentication on the Switch.

39.1 MAC Authentication Overview

MAC authentication allows you to validate access to a port based on the MAC address and password of the client.

You also need to configure a RADIUS server (see Chapter 54 on page 197).

See also Chapter 24 on page 99 for IEEE 802.1x port authentication commands and Chapter 50 on page 185 for port security commands.

39.2 Command Summary

The following section lists the commands for this feature.

Table 93 mac-authentication Command Summary

COMMAND	DESCRIPTION	M	P
`show mac-authentication`	Displays MAC authentication settings for the Switch.	E	13
`show mac-authentication config`	Displays MAC authentication settings on a port by port basis with authentication statistics for each port.	E	13
`mac-authentication`	Enables MAC authentication on the Switch.	C	13
`mac-authentication nameprefix <name-string>`	Sets the prefix appended to the MAC address before it is sent to the RADIUS server for authentication. The prefix can be up to 32 printable ASCII characters.	C	13
`mac-authentication password <name-string>`	Sets the password sent to the RADIUS server for clients using MAC authentication. The password can be up to 32 printable ASCII characters.	C	13
`mac-authentication timeout <1-3000>`	Specifies the amount of time before the Switch allows a client MAC address that fails authentication to try and authenticate again. This settings is superseded by the `mac-aging-time` command.	C	13
`no mac-authentication`	Disables MAC authentication on the Switch.	C	13

Table 93 mac-authentication Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no mac-authentication timeout`	Sets the MAC address entries learned via MAC authentication to never age out.	C	13
`interface port-channel <port-list>`	Enables a port or a list of ports for configuration.	C	13
`mac-authentication`	Enables MAC authentication via a RADIUS server on the port(s).	C	13
`no mac-authentication`	Disables MAC authentication via a RADIUS server on the port(s).	C	13

39.3 Command Examples

This example enables MAC authentication on the Switch. Specifies the name prefix **clientName** and the MAC authentication password **Lech89**. Next, MAC authentication is activated on ports 1 - 5 and configuration details are displayed.

```
sysname(config)# mac-authentication
sysname(config)# mac-authentication nameprefix clientName
sysname(config)# mac-authentication password Lech89
sysname(config)# interface port-channel 1-5
sysname(config-interface)# mac-authentication
sysname(config-interface)# exit
sysname(config)# exit
sysname# show mac-authentication
NamePrefix:     clientName
Password:       Lech89
Update Time:    None
Deny Number:    0
```

40

MAC-based VLAN Commands

Use these commands to group traffic into logical VLANs based on a specified MAC address.

40.1 MAC-based VLAN Overview

MAC-based VLANs allow you to group traffic into logical VLANs based on the MAC address you specify. When a frame is received on a port, the Switch checks if a tag is added already and the MAC address it came from. The untagged packets from the same MAC address(es) are then placed in the same MAC-based VLAN. One advantage of using MAC-based VLANs is that priority can be assigned to traffic from the same MAC address(es).

MAC-based VLAN applies to untagged packets and is applicable only when you use IEEE 802.1Q-tagged VLAN.

40.2 Command Summary

The following section lists the commands for this feature.

Table 94 mac-based-vlan Command Summary

COMMAND	DESCRIPTION	M	P
`show mac-vlan`	Displays MAC-based VLAN settings.	E	13
`mac-based-vlan name <name> mac-address <mac-address> vlan <vid> priority <0-7>`	Creates a MAC-based VLAN. *name*: 1-32 alphanumeric characters.	C	13
`mac-based-vlan name <name> mac-address <mac-address> vlan <vid> priority <0-7> inactive`	Disables the specified MAC-based VLAN. *name*: 1-32 alphanumeric characters.	C	13
`no mac-based-vlan all`	Removes all MAC-based VLANs.	C	13
`no mac-based-vlan mac-address <mac-address>`	Removes the specified MAC-based VLAN.	C	13

40.3 Command Examples

This example creates one MAC-based VLAN and displays the settings on the Switch.

```
sysname# configure
sysname(config)# mac-based-vlan name test mac-address 00:c5:01:23:45:67
vlan 1 priority 3
sysname(config)# exit
sysname# show mac-vlan
Name           MAC addr  Vlan  Priority  Entry Active
----  -----------------  ----  --------  ------------
test  00:c5:01:23:45:67     1         3           Yes
sysname#
```

41

MAC Filter Commands

Use these commands to filter traffic going through the Switch based on the MAC addresses and VLAN group (ID).

Use the running configuration commands to look at the current MAC filter settings. See Chapter 58 on page 227.

41.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 95 mac-filter User-input Values

COMMAND	DESCRIPTION
name	1-32 alphanumeric characters.

The following section lists the commands for this feature.

Table 96 mac-filter Command Summary

COMMAND	DESCRIPTION	M	P
`mac-filter name <name> mac <mac-addr> vlan <vlan-id> drop <src|dst|both>`	Configures a static MAC address port filtering rule.	C	13
`no mac-filter mac <mac-addr> vlan <vlan-id>`	Deletes the specified MAC filter rule.	C	13
`mac-filter name <name> mac <mac-addr> vlan <vlan-id> drop <src|dst|both> inactive`	Disables a static MAC address port filtering rule.	C	13
`no mac-filter mac <mac-addr> vlan <vlan-id> inactive`	Enables the specified MAC-filter rule.	C	13

41.2 Command Examples

This example creates a MAC filter called “filter1” that drops packets coming from or going to MAC address 00:12:00:12:00:12 on VLAN 1.

```
sysname# configure
sysname(config)# mac-filter name filter1 mac 00:12:00:12:00:12 vlan 1
```

42

MAC Forward Commands

Use these commands to configure static MAC address forwarding.

Use the MAC address commands to look at the current MAC forward settings. See Chapter 38 on page 157.

42.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 97 mac-forward User-input Values

COMMAND	DESCRIPTION
name	1-32 alphanumeric characters.

The following section lists the commands for this feature.

Table 98 mac-forward Command Summary

COMMAND	DESCRIPTION	M	P
`mac-forward name <name> mac <mac-addr> vlan <vlan-id> interface <interface-id>`	Configures a static MAC address forwarding rule.	C	13
`no mac-forward mac <mac-addr> vlan <vlan-id> interface <interface-id>`	Removes the specified MAC forwarding entry, belonging to a VLAN group forwarded through an interface.	C	13
`mac-forward name <name> mac <mac-addr> vlan <vlan-id> interface <interface-id> inactive`	Disables a static MAC address forwarding rule.	C	13
`no mac-forward mac <mac-addr> vlan <vlan-id> interface <interface-id> inactive`	Enables the specified MAC address, belonging to a VLAN group forwarded through an interface.	C	13

43

Mirror Commands

Use these commands to copy a traffic flow for one or more ports to a monitor port so that you can examine the traffic on the monitor port without interference.

43.1 Command Summary

The following section lists the commands for this feature.

Table 99 mirror Command Summary

COMMAND	DESCRIPTION	M	P
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`mirror`	Enables port mirroring in the interface.	C	13
`mirror dir <ingress|egress|both>`	Enables port mirroring for incoming (`ingress`), outgoing (`egress`) or both incoming and outgoing (`both`) traffic.	C	13
`no mirror`	Disables port mirroring on the port(s).	C	13
`mirror-port`	Enables port mirroring on the Switch.	C	13
`mirror-port <port-num>`	Specifies the monitor port (the port to which traffic flow is copied) for port mirroring.	C	13
`mirror-port rspan-vid <vid>`	Sets the VLAN ID that the Switch adds to the mirrored traffic before forwarding it out. This allows you to separate the mirrored traffic from the non-mirrored traffic on the monitor port. The tag will be added even the mirrored traffic is double-tagged.	C	13
`no mirror`	Disables port mirroring on the Switch.	C	13
`no mirror-port`	Disables port mirroring on the Switch.	C	13
`show mirror`	Displays the port mirror settings.	E	13

43.2 Command Examples

This example enables port mirroring and copies outgoing traffic from ports 1, 4, 5, and 6 to port 3.

```
sysname# configure
sysname(config)# mirror-port
sysname(config)# mirror-port 3
sysname(config)# interface port-channel 1,4-6
sysname(config-interface)# mirror
sysname(config-interface)# mirror dir egress
```

44

MRSTP Commands

Use these commands to configure MRSTP on the Switch.

44.1 MRSTP Overview

The Switch allows you to configure multiple instances of Rapid Spanning Tree Protocol (RSTP) as defined in the following standard.

- IEEE 802.1w Rapid Spanning Tree Protocol

See Chapter 64 on page 241 for information on RSTP commands and Chapter 45 on page 171 for information on MSTP commands.

44.2 Command Summary

The following section lists the commands for this feature.

Table 100 Command Summary: mrstp

COMMAND	DESCRIPTION	M	P
`show mrstp <tree-index>`	Displays multiple rapid spanning tree configuration for the specified tree. *tree-index*: this is a number identifying the RSTP tree configuration. Note: The number of RSTP tree configurations supported differs by model. Refer to your User's Guide for details.	E	3
`spanning-tree mode <RSTP|MRSTP|MSTP>`	Specifies the STP mode you want to implement on the Switch.	C	13
`mrstp <tree-index>`	Activates the specified RSTP configuration.	C	13
`mrstp <tree-index> priority <0~61440>`	Sets the bridge priority of the Switch for the specified RSTP configuration.		
`mrstp <tree-index> hello-time <1~10> maximum-age <6~40> forward-delay <4~30>`	Sets the Hello Time, Maximum Age and Forward Delay values on the Switch for the specified RSTP configuration.		
`mrstp interface <port-list>`	Activates RSTP on the specified ports.	C	13
`mrstp interface <port-list> path-cost <1~65535>`	Sets a path cost to the specified ports.	C	13

Table 100 Command Summary: mrstp

COMMAND	DESCRIPTION	M	P
`mrstp interface <port-list> priority <0~255>`	Sets the priority value to the specified ports for RSTP.	C	13
`mrstp interface <port-list> tree-index <1~2>`	Assigns the specified port list to a specific RSTP configuration.	C	13
`no mrstp <tree-index>`	Disables the specified RSTP configuration.	C	13
`no mrstp interface <port-list>`	Disables the STP assignment from the specified port(s).	C	13

44.3 Command Examples

This example configures MRSTP in the following way:

- Enables MRSTP on the Switch.
- Activates tree **1** and sets the bridge priority, Hello Time, Maximum Age and Forward Values for this RSTP configuration.
- Activates MRSTP for ports **1-5** and sets path cost on these ports to **127**.
- Adds ports **1-5** to tree index **1**.

```
sysname# configure
sysname(config)# spanning-tree mode mrstp
sysname(config)# mrstp 1
sysname(config)# mrstp 1 priority 16384
sysname(config)# mrstp 1 hello-time 2 maximum-age 15 forward-delay 30
sysname(config)# mrstp interface 1-5
sysname(config)# mrstp interface 1-5 path-cost 127
sysname(config)# mrstp interface 1-5 tree-index 1
sysname(config)# exit
```

45

MSTP Commands

Use these commands to configure Multiple Spanning Tree Protocol (MSTP) as defined in IEEE 802.1s.

45.1 Command Summary

The following section lists the commands for this feature.

Table 101 mstp Command Summary

COMMAND	DESCRIPTION	M	P
`show mstp`	Displays MSTP configuration for the Switch.	E	3
`spanning-tree mode <RSTP|MRSTP|MSTP>`	Specifies the STP mode you want to implement on the Switch.	C	13
`mstp`	Activates MSTP on the Switch. Note: You should switch the STP mode to MSTP first using the previous command.	C	13
`no mstp`	Disables MSTP on the Switch.	C	13
`mstp configuration-name <`*`name`*`>`	Sets a name for an MSTP region. *`name`*: 1-32 printable characters	C	13
`mstp hello-time <1-10> maximum-age <6-40> forward-delay <4-30>`	Sets Hello Time, Maximum Age and Forward Delay. `hello-time`: The time interval in seconds between BPDU (Bridge Protocol Data Units) configuration message generations by the root switch. `maximum-age`: The maximum time (in seconds) the Switch can wait without receiving a BPDU before attempting to reconfigure. `forward-delay`: The maximum time (in seconds) the Switch will wait before changing states.	C	13
`mstp revision <0~65535>`	Sets the revision number for this MST Region configuration.	C	13
`mstp max-hop <1~255>`	Sets the maximum hop value before BPDUs are discarded in the MST Region.	C	13

Table 102 mstp instance Command Summary

COMMAND	DESCRIPTION	M	P
`show mstp instance <0~16>`	Displays MSTP instance configuration.	E	3
`no mstp instance <0~16>`	Disables the specified MST instance on the Switch.	C	13

Table 102 mstp instance Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`mstp instance <0~16> priority <0~61440>`	Specifies the bridge priority of the instance. `priority`: Must be a multiple of 4096.	C	13
`mstp instance <0~16> vlan <vlan-list>`	Specifies the VLANs that belongs to the instance.	C	13
`no mstp instance <0-16> vlan <1-4094>`	Clears all VLAN assignments on an MST instance.	C	13
`mstp instance <0~16> interface port-channel <port-list>`	Specifies the ports you want to participate in this MST instance.	C	13
`no mstp instance <0~16> interface port-channel <port-list>`	Disables the assignment of specific ports from an MST instance.	C	13
`mstp instance <0~16> interface port-channel <port-list> path-cost <1~65535>`	Specifies the cost of transmitting a frame to a LAN through the port(s). It is recommended you assign it according to the speed of the bridge.	C	13
`mstp instance <0~16> interface port-channel <port-list> priority <1~255>`	Sets the priority for the specified ports. Priority decides which port should be disabled when more than one port forms a loop in a Switch. Ports with a higher priority numeric value are disabled first.	C	13

45.2 Command Examples

This example shows the current MSTP configuration.

```
sysname# show mstp
  (a)BridgeMaxAge:              20      (seconds)
  (b)BridgeHelloTime:           2       (seconds)
  (c)BridgeForwardDelay:        15      (seconds)
  (d)BridgeMaxHops:             128     (seconds)
  (e)TransmissionLimit:         3
  (f)ForceVersion:              3
  (g)MST Configuration ID
     Format Selector:           0
     Configuration Name:        001349aefb7a
     Reveision Number:          0
     Configuration Digest:      0xAC36177F50283CD4B83821D8AB26DE62
     msti       vlans mapped
     ----------------------------
      0         1-4094
     ----------------------------
```

The following table describes the labels in this screen.

Table 103 show mstp

LABEL	DESCRIPTION
BridgeMaxAge	This field displays the maximum time (in seconds) the Switch can wait without receiving a configuration message before attempting to reconfigure.
BridgeHelloTime	This field displays the time interval (in seconds) at which the Switch transmits a configuration message.
BridgeForwardDelay	This field displays the time (in seconds) the Switch will wait before changing states (that is, listening to learning to forwarding).

Table 103 show mstp (continued)

LABEL	DESCRIPTION
BridgeMaxHops	This field displays the number of hops (in seconds) in an MSTP region before the BPDU is discarded and the port information is aged.
TransmissionLimit	This field displays the maximum number of BPDUs that can be transmitted in the interval specified by **BridgeHelloTime**.
ForceVersion	This field indicates whether BPDUs are RSTP (a value less than 3) or MSTP (a value greater than or equal to 3).
MST Configuration ID	
Format Selector	This field displays zero, which indicates the use of the fields below.
Configuration Name	This field displays the configuration name for this MST region.
Revision Number	This field displays the revision number for this MST region.
Configuration Digest	A configuration digest is generated from the VLAN-MSTI mapping information. This field displays the 16-octet signature that is included in an MSTP BPDU. This field displays the digest when MSTP is activated on the system.
msti	This field displays the MSTI ID.
vlans mapped	This field displays which VLANs are mapped to an MSTI.

This example shows the current CIST configuration (MSTP instance 0).

```
sysname# show mstp instance 0
Bridge Info: MSTID: 0
  (a)BridgeID:                  8000-001349aefb7a
  (b)TimeSinceTopoChange:       247
  (c)TopoChangeCount:           0
  (d)TopoChange:                0
  (e)DesignatedRoot:            8000-001349aefb7a
  (f)RootPathCost:              0
  (g)RootPort:                  0x0000
  (h)RootMaxAge:                20      (seconds)
  (i)RootHelloTime:             2       (seconds)
  (j)RootForwardDelay:          15      (seconds)
  (k)BridgeMaxAge:              20      (seconds)
  (l)BridgeHelloTime:           2       (seconds)
  (m)BridgeForwardDelay:        15      (seconds)
  (n)ForceVersion:              mstp
  (o)TransmissionLimit:         3

  (p)CIST_RRootID:              8000-001349aefb7a
  (q)CIST_RRootPathCost:        0
```

The following table describes the labels in this screen.

Table 104 show mstp instance

LABEL	DESCRIPTION
MSTID	This field displays the MSTI ID.
BridgeID	This field displays the unique identifier for this bridge, consisting of bridge priority plus MAC address.
TimeSinceTopoChange	This field displays the time since the spanning tree was last reconfigured.

Table 104 show mstp instance (continued)

LABEL	DESCRIPTION
TopoChangeCount	This field displays the number of times the spanning tree has been reconfigured.
TopoChange	This field indicates whether or not the current topology is stable. 0: The current topology is stable. 1: The current topology is changing.
DesignatedRoot	This field displays the unique identifier for the root bridge, consisting of bridge priority plus MAC address.
RootPathCost	This field displays the path cost from the root port on this Switch to the root switch.
RootPort	This field displays the priority and number of the port on the Switch through which this Switch must communicate with the root of the Spanning Tree.
RootMaxAge	This field displays the maximum time (in seconds) the root switch can wait without receiving a configuration message before attempting to reconfigure.
RootHelloTime	This field displays the time interval (in seconds) at which the root switch transmits a configuration message.
RootForwardDelay	This field displays the time (in seconds) the root switch will wait before changing states (that is, listening to learning to forwarding).
BridgeMaxAge	This field displays the maximum time (in seconds) the Switch can wait without receiving a configuration message before attempting to reconfigure.
BridgeHelloTime	This field displays the time interval (in seconds) at which the Switch transmits a configuration message.
BridgeForwardDelay	This field displays the time (in seconds) the Switch will wait before changing states (that is, listening to learning to forwarding).
ForceVersion	This field indicates whether BPDUs are RSTP (a value less than 3) or MSTP (a value greater than or equal to 3).
TransmissionLimit	This field displays the maximum number of BPDUs that can be transmitted in the interval specified by **BridgeHelloTime**.
CIST_RRootID	This field displays the unique identifier for the CIST regional root bridge, consisting of bridge priority plus MAC address.
CIST_RRootPathCost	This field displays the path cost from the root port on this Switch to the CIST regional root switch.

This example adds the Switch to the MST region **MSTRegionNorth**. **MSTRegionNorth** is on revision number 1. In **MSTRegionNorth**, VLAN 2 is in MST instance 1, and VLAN 3 is in MST instance 2.

```
sysname# configure
sysname(config)# mstp
sysname(config)# mstp configuration-name MSTRegionNorth
sysname(config)# mstp revision 1
sysname(config)# mstp instance 1 vlan 2
sysname(config)# mstp instance 2 vlan 3
sysname(config)# exit
```

46

Multiple Login Commands

Use these commands to configure multiple administrator logins on the Switch.

46.1 Command Summary

The following section lists the commands for this feature.

Table 105 multi-login Command Summary

COMMAND	DESCRIPTION	M	P
`show multi-login`	Displays multi-login information.	E	13
`multi-login`	Enables multi-login.	C	14
`no multi-login`	Disables another administrator from logging into Telnet or SSH.	C	14

46.2 Command Examples

This example shows the current administrator logins.

```
sysname# show multi-login
[session info ('*' denotes your session)]
index session    remote ip
----- ---------- ---------------
    1 telnet-d   172.1.1.15
 *  2 telnet-d   172.1.1.15
```

The following table describes the labels in this screen.

Table 106 show multi-login

LABEL	DESCRIPTION
index	This field displays a sequential number for this entry. If there is an asterisk (*) next to the index number, this entry is your session.
session	This field displays the service the administrator used to log in.
remote ip	This field displays the IP address of the administrator's computer.

47

MVR Commands

Use these commands to configure Multicast VLAN Registration (MVR).

47.1 Command Summary

The following section lists the commands for this feature.

Table 107 mvr Command Summary

COMMAND	DESCRIPTION	M	P
`show mvr`	Shows the MVR status.	E	13
`show mvr <vlan-id>`	Shows the detailed MVR status and MVR group configuration for a VLAN.	E	13
`mvr behavior <0:IGMP Snooping| 1:IGMP Proxy>`	Set this to `0` to use IGMP snooping mechanism for multicast VLAN traffic in this MVR network. IGMP snooping enables the Switch to handle multicast traffic more efficiently and effectively. Set this to `1` to use IGMP proxy mechanism for multicast VLAN traffic in this MVR network. Select this to have the Switch reduce multicast traffic by sending IGMP host messages to a multicast router or server on behalf of all multicast hosts connected to the Switch.	C	13
`mvr <vlan-id>`	Enters config-mvr mode for the specified MVR (multicast VLAN registration). Creates the MVR, if necessary.	C	13
`8021p-priority <0~7>`	Sets the IEEE 802.1p priority of outgoing MVR packets.	C	13
`inactive`	Disables these MVR settings.	C	13
`no inactive`	Enables these MVR settings.	C	13
`mode <dynamic|compatible>`	Sets the MVR mode (dynamic or compatible).	C	13
`name <name-str>`	Sets the MVR name for identification purposes. <*name-str*>: 1-32 English keyboard characters	C	13
`receiver-port <port-list>`	Sets the receiver port(s). An MVR receiver port can only receive multicast traffic in a multicast VLAN. This is applicable for VDSL ports.	C	13
`no receiver-port <port-list>`	Disables the receiver port(s). An MVR receiver port can only receive multicast traffic in a multicast VLAN.	C	13
`source-port <port-list>`	Sets the source port(s). An MVR source port can send and receive multicast traffic in a multicast VLAN. This is applicable for Ethernet ports.	C	13
`no source-port <port-list>`	Disables the source port(s). An MVR source port can send and receive multicast traffic in a multicast VLAN.	C	13
`tagged <port-list>`	Sets the port(s) to tag VLAN tags.	C	13

Table 107 mvr Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no tagged <port-list>`	Sets the port(s) to untag VLAN tags.	C	13
`group <name-str> start-address <ip-address> end-address <ip-address>`	Sets the multicast group range for the MVR. <*name-str*>: 1-32 English keyboard characters	C	13
`no group`	Disables all MVR group settings.	C	13
`no group <name-str>`	Disables the specified MVR group setting.	C	13
`no mvr <vlan-id>`	Removes an MVR configuration of the specified VLAN from the Switch.	C	13

47.2 Command Examples

This example configures MVR in the following ways:

1. Enters MVR mode. This creates a multicast VLAN with the name `multivlan` (assigned in the next command) and the VLAN ID of 3.
2. Specifies source ports 2, 3, 5 for MVR VLAN 3.
3. Specifies receiver ports 6-8 for MVR VLAN 3.
4. Specifies dynamic mode for the multicast group.
5. Configures MVR multicast group addresses 224.0.0.1 through 224.0.0.255 by the name of `ipgroup`.
6. Exits MVR mode.

```
sysname(config)# mvr 3
sysname(config-mvr)# name multivlan
sysname(config-mvr)# source-port 2,3,5
sysname(config-mvr)# receiver-port 6-8
sysname(config-mvr)# mode dynamic
sysname(config-mvr)# group ipgroup start-address 224.0.0.1 end-address
--> 224.0.0.255
sysname(config-mvr)# exit
```

48

Password Commands

Use these commands to configure passwords for specific privilege levels on the Switch.

48.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 108 password User-input Values

COMMAND	DESCRIPTION
password	1-32 alphanumeric characters.

The following section lists the commands for this feature.

Table 109 password Command Summary

COMMAND	DESCRIPTION	M	P
`admin-password <password> <confirm-string>`	Changes the administrator password.	C	14
`password <password>`	Changes the password for enable mode.	C	14
`password <password> privilege <0~14>`	Sets the access privilege level for the specified enable mode password. Each command has a privilege level. A user can only use commands with lower privilege levels than the password the user used entering enable mode.	C	14
`no password privilege <0~14>`	Removes an enable mode password setting with the specified privilege level.	C	14

48.2 Command Example

This example shows how to change the administrator password to ‘987654’.

```
sysname# configure
sysname(config)# admin-password 987654 987654
sysname(config)# exit
sysname#
```

This example shows how to set the password to ‘abcd’ and the privilege to 14 for enable mode.

```
sysname# configure
sysname(config)# password abcd privilege 14
  Enable password level 14 set
sysname(config)# exit
sysname#
```

49

Policy Commands

Use these commands to specify the treatment a traffic flow gets after you identify the traffic flow.

You have to create a classification rule before configuring a policy rule. See Chapter 11 on page 57 for classifier commands.

49.1 Command Summary

The following section lists the commands for this feature.

Table 110 policy Command Summary

COMMAND	DESCRIPTION	M	P
`show policy [name]`	Displays all policy-related information. Optionally, displays the specified policy.	E	13
`policy <name> classifier <classifier-list> <[vlan <vlan-id>] [egress-port <port-num>] [priority <0~7>] [dscp <0-63>] [tos <0~7>] [bandwidth <1-1023>] [outgoing-packet-format <tagged|untagged>] [out-of-profile-dscp <0-63>] [forward-action <drop|forward>] [queue-action <prio-set|prio-queue|prio-replace-tos>] [diffserv-action <diff-set-tos|diff-replace-priority|diff-set-dscp>] [outgoing-mirror] [outgoing-eport] [outgoing-non-unicast-eport] [outgoing-set-vlan] [metering] [out-of-profile-action <[change-dscp] [drop] [forward] [set-drop-prec]>] [inactive]>`	Configures a policy. A classifier distinguishes traffic into flows based on the configured criteria. A policy rule ensures that a traffic flow gets the requested treatment in the network. *name*: 1-32 English keyboard characters These settings are parameters. They have no effect by themselves unless the appropriate action is specified below. `vlan`: Outgoing VLAN ID. `egress-port`: Outgoing port. `priority`: Outgoing IEEE 802.1p priority. `dscp`: Outgoing DSCP value. `tos`: Outgoing Type of Service (ToS) value. `bandwidth`: Maximum rate (in Mbps) at which flow is forwarded through Switch. `outgoing-packet-format`: VLAN tagging on the specified `egress port`. `out-of-profile-dscp`: Outgoing DSCP value for out-of-profile traffic. These settings are actions, which define how a traffic flow is treated. `forward-action`: Control packet forwarding. `drop`: Drop the packet. `forward`: Do not drop the packet. `queue-action`: Change the IEEE 802.1p priority field. `prio-set`: Replace the IEEE 802.1p priority field with the specified `priority`. `prio-queue`: Put the packets in the designated queue. `prio-replace-tos`: Replace the IEEE 802.1p priority field with the specified `tos`. `diffserv-action`: Changes the ToS or DSCP value. `diff-set-tos`: Replace the TOS field with the specified `tos`. `diff-replace-priority`: Replace the TOS field with the specified `priority`. `diff-set-dscp`: Replace the DSCP value with the specified `dscp`. `outgoing-mirror`: Send packet to mirror port. `outgoing-eport`: Send packet to the specified `egress port`. `outgoing-non-unicast-eport`: Send broadcast, multicast, DLF, marked-to-drop, or CPU frames to egress port. `outgoing-set-vlan`: Replace the VLAN ID with the specified `vlan`. `metering`: Enables the specified `bandwidth` for traffic flow. `out-of-profile-action`: Specifies the action for out-of-profile traffic (traffic above the specified `bandwidth`). `change-dscp`: Replace the DSCP value with the specified `out-of-profile-dscp`. `drop`: Drop out-of-profile traffic. `forward`: Forward out-of-profile traffic to its destination. `set-drop-prec`: Do not drop the matching frame previously marked for dropping. `inactive`: Deactivates the policy.	C	13

Table 110 policy Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no policy <name>`	Deletes the specified policy. A policy sets actions for the classified traffic.	C	13
`no policy <name> inactive`	Enables a policy.	C	13
`policy help`	Provides more information about the specified command.	C	13

49.2 Command Examples

This example limits the amount of bandwidth for traffic from MAC address 00:50:ba:ad:4f:81 on port 2 to 1000 Kbps. Any traffic above this limit should be discarded.

First, configure a classifier that identifies all traffic from MAC address 00:50:ba:ad:4f:81 on port 2. Then, configure a policy to limit the amount of bandwidth to 1000 Kbps and to discard traffic above the limit for traffic identified by this classifier.

```
sysname# configure
sysname(config)# classifier Example source-mac 00:50:ba:ad:4f:81
--> source-port 2
sysname(config)# policy Test classifier Example bandwidth 1000 metering
--> out-of-profile-action drop
sysname(config)# exit
```

See Chapter 11 on page 57 for more information about `classifier` commands.

50

Port Security Commands

Use these commands to allow only packets with dynamically learned MAC addresses and/or configured static MAC addresses to pass through a port on the Switch. For maximum port security, enable port security, disable MAC address learning and configure static MAC address(es) for a port.

It is not recommended you disable both port security and MAC address learning because this will result in many broadcasts.

50.1 Command Summary

The following section lists the commands for this feature.

Table 111 port-security Command Summary

COMMAND	DESCRIPTION	M	P
`show port-security`	Displays all port security settings.	E	13
`show port-security <port-list>`	Displays port security settings on the specified port(s).	E	13
`port-security`	Enables port security on the Switch.	C	13
`port-security <port-list>`	Enables port security on the specified port(s).	C	13
`port-security <port-list> address-limit <number>`	Limits the number of (dynamic) MAC addresses that may be learned on the specified ports. <*number*>: 0-8192.	C	13
`port-security <port-list> learn inactive`	Disables MAC address learning on the specified port(s).	C	13
`port-security <port-list> MAC-freeze`	Disables MAC address learning and enables port security. Note: All previously learned dynamic MAC addresses are saved to the static MAC address table.	C	13
`no port-security`	Disables port security on the device.	C	13
`no port-security <port-list>`	Disables port security on the specified ports.	C	13
`no port-security <port-list> learn inactive`	Enables MAC address learning on the specified ports.	C	13

50.2 Command Examples

This example enables port security on port 1 and limits the number of learned MAC addresses to 5.

```
sysname# configure
sysname(config)# port-security
sysname(config)# port-security 1
sysname(config)# no port-security 1 learn inactive
sysname(config)# port-security 1 address-limit 5
sysname(config)# exit
sysname# show port-security 1
  Port Security Active : YES
  Port   Active   Address Learning   Limited Number of Learned MAC Address
   01      Y             Y                              5
```

51

Port-based VLAN Commands

Use these commands to configure port-based VLAN.

These commands have no effect unless port-based VLAN is enabled.

51.1 Command Summary

The following section lists the commands for this feature.

Table 112 egress Command Summary

COMMAND	DESCRIPTION	M	P
`show interfaces config <port-list> egress`	Displays outgoing port information. *port-list* example: 1-10 means for ports from 1 to 10.	E	13
`vlan-type <802.1q|port-based>`	Specifies the VLAN type.	C	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`egress set <port-list>`	Sets the outgoing traffic port list for a port-based VLAN.	C	13
`no egress set <port-list>`	Removes the specified ports from the outgoing traffic port list.	C	13

51.2 Command Examples

This example looks at the ports to which incoming traffic from ports 1 and 2 can be forwarded.

```
sysname# show interfaces config 1-2 egress
  Port 1: Enabled egress ports cpu, eg1
  Port 2: Enabled egress ports cpu, eg1-eg4
```

52

PPPoE Intermediate Agent Commands

Use these commands if you want the Switch to add a vendor-specific tag to PADI (PPPoE Active Discovery Initiation) and PADR (PPPoE Active Discovery Request) packets from PPPoE clients. This tag gives a PPPoE termination server additional information (such as the port number, VLAN ID, and MAC address) that the server can use to identify and authenticate a PPPoE client.

52.1 Command Summary

The following section lists the commands for this feature.

Table 113 PPPoE Intermediate Agent Command Summary

COMMAND	DESCRIPTION	M	P
`show pppoe+`	Shows PPPoE intermediate agent global settings for the whole system.	E	13
`show pppoe+ vlan <vlan-id|all>`	Shows PPPoE intermediate agent settings for the specified VLAN or all VLANs.	E	13
`pppoe+ [circuit-id]`	Enables PPPoE intermediate agent on the Switch (global-based). This mode has the Switch add an Agent Circuit ID tag to client PPPoE requests. By default, the Agent Circuit ID includes the slot ID and port number of the PPPoE client and VLAN ID on the PPPoE request packets. `circuit-id`: Set this to have the Switch append the specified circuit ID information (using the `pppoe+ circuitID-information` command) to the default Agent Circuit ID on received client PPPoE requests. Note: You cannot enable both global-based and VLAN-based PPPoE intermediate agent at the same time.	C	13
`pppoe+ circuitID-information <string>`	Sets the additional information that you want the Switch to append to the default Agent Circuit ID to client PPPoE requests. *string*: up to 59 printable characters. Spaces are allowed.	C	13
`no pppoe+`	Disables PPPoE intermediate agent (global-based) on the Switch.	C	13
`no pppoe+ circuit-id`	Sets the Switch to not append the additional circuit ID information to received client PPPoE requests.	C	13

Table 113 PPPoE Intermediate Agent Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`pppoe+ remote-id`	Sets the Switch to append the Remote ID information to client PPPoE requests.	C	13
`pppoe+ remoteID-information <string>`	Sets the additional information that you want the Switch to insert to client PPPoE requests. *string*: up to 63 printable characters. Spaces are allowed.	C	13
`no pppoe+ remote-id`	Sets the Switch to not append the additional Remote ID information you specified using the `pppoe+ remoteID-information` command.	C	13
`pppoe+ vlan <vlan-id> [circuit-id]`	Enables PPPoE intermediate agent on the specified VLAN. This mode has the Switch add an Agent Circuit ID tag to client PPPoE requests. By default, the Agent Circuit ID includes the slot ID and port number of the PPPoE client and VLAN ID on the PPPoE packet. *circuit-id*: Set this to append additional circuit ID information specified using the `pppoe+ vlan <vlan-id> circuitID-information <string>` to the default Agent Circuit ID. Note: You cannot enable both global-based and VLAN-based PPPoE intermediate agent at the same time. Note: You have to enter an existing VLAN ID. You can create VLAN IDs using the `vlan <vlan-id>` command.	C	13
`pppoe+ vlan <vlan-id> circuitID-information <string>`	Sets the additional information to add to client PPPoE requests on the specified VLAN. *string*: up to 59 printable characters. Spaces are allowed.	C	13
`no pppoe+ vlan <vlan-id>`	Disables PPPoE intermediate agent on the specified VLAN.	C	13
`no pppoe+ vlan <vlan-id> circuit-id`	Sets the Switch to not append the additional Circuit ID information you specified using the `pppoe+ circuitID-information` command to client PPPoE requests on the specified VLAN.	C	13
`pppoe+ vlan <vlan-id> remote-id`	Enables appending the Remote ID information to client PPPoE requests on the specified VLAN.	C	13
`pppoe+ vlan <vlan-id> remoteID-information <string>`	Sets the additional information that you want the Switch to insert to client PPPoE requests on the specified VLAN. *string*: up to 63 printable characters. Spaces are allowed.	C	13
`no pppoe+ vlan <vlan-id> remote-id`	Sets the Switch to not append the additional Remote ID information you specified using the `pppoe+ remoteID-information` command to client PPPoE requests on the specified VLAN.	C	13

52.1.1 Enable Global-based PPPoE Intermediate Agent Command Example

The following example activates the PPPoE intermediate agent (global-based), enables the circuit and remote IDs, and adds “testing” as circuit information and “remote-testing” as remote information to client PADI and PADR packets. At the end, this example shows the configuration result.

```
ras# configure terminal
ras(config)# pppoe+
ras(config)# pppoe+ circuit-id
ras(config)# pppoe+ circuitID-information testing
ras(config)# pppoe+ remote-id
ras(config)# pppoe+ remoteID-information remote-testing
ras(config)# exit
ras# show pppoe+
  PPPoE IA Configuration
  Active:   Yes
  Circuit-id: Enable
  Circuit-id Info: testing
  Remote-id:  Enable
  Remote-id Info:  remote-testing
```

52.1.2 Enable VLAN-based PPPoE Intermediate Agent Command Example

The following example activates the PPPoE intermediate agent for VLAN 2, enables the circuit and remote IDs, and adds “testing” as circuit information and “remote-testing” as remote information to client PADI and PADR packets on VLAN 2. At the end, this example shows the configuration result.

```
ras# configure terminal
ras(config)# pppoe+ vlan 2
ras(config)# pppoe+ vlan 2 circuit-id
ras(config)# pppoe+ vlan 2 circuitID-information testing
ras(config)# pppoe+ vlan 2 remote-id
ras(config)# pppoe+ vlan 2 remoteID-information remote-testing
ras(config)# exit
ras# show pppoe+ vlan 2
  PPPoE IA Configuration
  Vlan ID:  2
  Active:   Yes
  Circuit-id: Enable
  Circuit-id Info: testing
  Remote-id:  Enable
  Remote-id Info:  remote-testing
```

53

Protocol-based VLAN Commands

Use these commands to group traffic into logical VLANs based on a specified protocol.

53.1 Protocol-based VLAN Overview

Protocol-based VLANs allow you to group traffic into logical VLANs based on the protocol you specify. When an upstream frame is received on a port (configured for a protocol-based VLAN), the Switch checks the protocol and if a tag is already added. Untagged packets of the specified protocol are then placed in the same protocol-based VLAN. One advantage of using protocol-based VLANs is that priority can be assigned to traffic of the same protocol.

Protocol-based VLAN applies to untagged packets and is applicable only when you use IEEE 802.1Q-tagged VLAN.

53.2 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 114 protocol-based-vlan User-input Values

COMMAND	DESCRIPTION
name	1-32 alphanumeric characters.
ethernet-type	ip, ipx, arp, rarp, appletalk, decnet, sna, netbios, dlc, or <*ether-num*>. <*ether-num*>: 32-bit Ethernet protocol number in hexadecimal format (FFFF).

The following section lists the commands for this feature.

Table 115 protocol-based-vlan Command Summary

COMMAND	DESCRIPTION	M	P
`show interfaces config <port-list> protocol-based-vlan`	Displays protocol-based VLAN settings for the specified port(s).	E	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`protocol-based-vlan name <name> ethernet-type <ethernet-type> vlan <vlan-id>`	Creates a protocol-based VLAN with the protocol type and VLAN ID.	C	13
`protocol-based-vlan name <name> ethernet-type <ethernet-type> vlan <vlan-id> inactive`	Disables the protocol-based VLAN.	C	13
`no protocol-based-vlan ethernet-type <ethernet-type>`	Disables protocol-based VLAN of the specified protocol on the port(s).	C	13
`protocol-based-vlan name <name> packet-format <EtherII|SNAP|LLC> ethernet-type <ethernet-type> vlan <vlan-id> priority <0~7>`	Creates a protocol-based VLAN with the packet format, VLAN ID and priority.	C	13
`protocol-based-vlan name <name> packet-format <EtherII|SNAP|LLC> ethernet-type <ethernet-type> vlan <vlan-id> priority <0~7> inactive`	Disables the protocol-based VLAN.	C	13
`no protocol-based-vlan packet-format <EtherII|SNAP|LLC> ethernet-type <ethernet-type>`	Disables protocol-based VLAN of the specified packet format and protocol on the port(s).	C	13

53.3 Command Examples

This example creates two protocol-based VLAN A and B.

- Protocol-based VLAN A is used for ARP traffic on ports 1-3.
- Protocol-based VLAN B is used for Apple Talk traffic on ports 6-7.

Ports 1-4 already belong to static VLAN 100; ports 5-8 already belong to static VLAN 120.

```
sysname# configure
sysname(config)# interface port-channel 1-3
sysname(config-interface)# protocol-based-vlan name A ethernet-type arp
--> vlan 1 inactive
sysname(config-interface)# exit
sysname(config)# interface port-channel 6-7
sysname(config-interface)# protocol-based-vlan name B ethernet-type
--> appletalk vlan 1 inactive
sysname(config-interface)# exit
sysname(config)# exit
sysname# show interfaces config 1-8 protocol-based-vlan
Name  Port  Packet type  Ethernet type  Vlan  Priority  Active
-------------------------------------------------------------
   A     1      EtherII            arp   100         0     Yes
   A     2      EtherII            arp   100         0     Yes
   A     3      EtherII            arp   100         0     Yes
   B     6      EtherII      appletalk   120         0     Yes
   B     7      EtherII      appletalk   120         0     Yes
```

54

RADIUS Commands

Use these commands to configure external RADIUS (Remote Authentication Dial-In User Service) servers.

54.1 Command Summary

The following section lists the commands for this feature.

Table 116 radius-server Command Summary

COMMAND	DESCRIPTION	M	P
`show radius-server`	Displays RADIUS server settings.	E	13
`radius-server mode <index-priority|round-robin>`	Specifies how the Switch decides which RADIUS server to select if you configure multiple servers. `index-priority`: The Switch tries to authenticate with the first configured RADIUS server. If the RADIUS server does not respond, then the Switch tries to authenticate with the second RADIUS server. `round-robin`: The Switch alternates between RADIUS servers that it sends authentication requests to.	C	13
`radius-server host <index> <ip-address>`	Sets the specified RADIUS server's IP address. *`index`*: The index number of a RADIUS server.	C	13
`radius-server host <index> <ip-address> [acct-port <socket-number>] [key <key-string>]`	Specifies the IP address of the RADIUS authentication server. Optionally, sets the port number and shared secret. *`key-string`*: 1-32 alphanumeric characters.	C	13
`radius-server host <index> <ip-address> [acct-port <socket-number>] [key <key-string>]`	Specifies the IP address of the specified RADIUS authentication server. Optionally, sets the port number and shared secret. *`index`*: The index number of a RADIUS server. *`key-string`*: 1-32 alphanumeric characters.	C	13
`radius-server timeout <1-1000>`	Specify the amount of time (in seconds) that the Switch waits for an authentication request response from the RADIUS server. In `index-priority` mode, the timeout is divided by the number of servers you configure. For example, if you configure two servers and the timeout is 30 seconds, then the Switch waits 15 seconds for a response from each server.	C	13
`no radius-server <index>`	Resets the specified RADIUS server to its default values.	C	13

Table 117 radius-accounting Command Summary

COMMAND	DESCRIPTION	M	P
`show radius-accounting`	Displays RADIUS accounting server settings.	E	3
`radius-accounting timeout <1-1000>`	Specifies the RADIUS accounting server timeout value.	C	13
`radius-accounting host <index> <ip> [acct-port <socket-number>] [key <key-string>]`	Specifies the IP address of the RADIUS accounting server. Optionally, sets the port number and key of the external RADIUS accounting server. *index*: 1 or 2. *key-string*: 1-32 alphanumeric characters.	C	13
`no radius-accounting <index>`	Resets the specified RADIUS accounting server to its default values.	C	13

54.2 Command Examples

This example sets up one primary RADIUS server (172.16.10.10) and one secondary RADIUS server (172.16.10.11). The secondary RADIUS server is also the accounting server.

```
sysname# configure
sysname(config)# radius-server mode index-priority
sysname(config)# radius-server host 1 172.16.10.10
sysname(config)# radius-server host 2 172.16.10.11
sysname(config)# radius-accounting host 1 172.16.10.11
sysname(config)# exit
```

55

Rate Limit Commands

Use these commands to configure the rate limit feature which defines incoming and outgoing data rate limits for VDSL port(s).

The ingress and egress total data rate limits should not be over the actual maximum port bandwidth. You cannot associate port(s) with a profile whose total data rate exceeds the actual maximum port bandwidth.

A port can be associated to one and only one rate limit profile.

55.1 Command Summary

The following section lists the commands for this feature.

Table 118 Rate Limit Command Summary

COMMAND	DESCRIPTION	M	P
`show ratelimit-profile [profile-name]`	Displays all or the specified rate limit profile settings. In the output, **0** displayed in the incoming or outgoing field means no bandwidth limit. By default, the profile **DEFVAL** is available without any bandwidth limit.	E	13
`show ratelimit-profile per-queue [profile-name]`	Displays all or the specified per queue rate limit profile settings. In the output, **0** displayed in the incoming or outgoing field means no bandwidth limit. By default, the profile **DEFVAL** is available without any bandwidth limit.	E	13
`ratelimit-profile <profile-name>`	Creates or modifies a rate limit profile and enters the config-ratelimitprofile mode for the profile.	C	13
`egress <0~1,000,000>`	Sets the egress data rate limit in Kbps. **0** means no maximum bandwidth limit.	C	13
`egress active`	Activates the egress data rate limit you set using the command above.	C	13
`ingress <0~1,000,000>`	Sets the ingress data rate limit in Kbps. **0** means no maximum bandwidth limit.	C	13
`ingressC <0~1,000,000>`	Sets the ingress committed data rate limit in Kbps. **0** means no this bandwidth limit.	C	13
`ingressC active`	Activates the ingress committed data rate limit you set using the command above.	C	13

Table 118 Rate Limit Command Summary (continued)

COMMAND	DESCRIPTION	M	P
ingressP <0~1,000,000>	Sets the ingress peak data rate limit in Kbps. **0** means no this bandwidth limit. Note: This ingress peak rate should be greater than the ingress committed rate.	C	13
ingressP active	Activates the ingress peak data rate limit you set using the command above.	C	13
no egress	Disables the egress data rate limit.	C	13
no ingressC	Disables the ingress committed rate limit.	C	13
no ingressP	Disables the ingress peak data rate limit.	C	13
ratelimit-profile per-queue <*profile-name*>	Creates or modifies a per queue rate limit profile and enters the config-ratelimitprofile mode for the profile.	C	13
queue0-cir <0~1,000,000>	Sets the guaranteed bandwidth in Kbps for the incoming traffic flow assigned to queue 0.	C	13
queue0-pir <0~1,000,000>	Sets the maximum bandwidth in Kbps for the incoming traffic flow assigned to queue 0.	C	13
queue1-cir <0~1,000,000>	Sets the guaranteed bandwidth in Kbps for the incoming traffic flow assigned to queue 1.	C	13
queue1-pir <0~1,000,000>	Sets the maximum bandwidth in Kbps for the incoming traffic flow assigned to queue 1.	C	13
queue2-cir <0~1,000,000>	Sets the guaranteed bandwidth in Kbps for the incoming traffic flow assigned to queue 2.	C	13
queue2-pir <0~1,000,000>	Sets the maximum bandwidth in Kbps for the incoming traffic flow assigned to queue 2.	C	13
queue3-cir <0~1,000,000>	Sets the guaranteed bandwidth in Kbps for the incoming traffic flow assigned to queue 3.	C	13
queue3-pir <0~1,000,000>	Sets the maximum bandwidth in Kbps for the incoming traffic flow assigned to queue 3.	C	13
queue4-cir <0~1,000,000>	Sets the guaranteed bandwidth in Kbps for the incoming traffic flow assigned to queue 4.	C	13
queue4-pir <0~1,000,000>	Sets the maximum bandwidth in Kbps for the incoming traffic flow assigned to queue 4.	C	13
queue5-cir <0~1,000,000>	Sets the guaranteed bandwidth in Kbps for the incoming traffic flow assigned to queue 5.	C	13
queue5-pir <0~1,000,000>	Sets the maximum bandwidth in Kbps for the incoming traffic flow assigned to queue 5.	C	13
queue6-cir <0~1,000,000>	Sets the guaranteed bandwidth in Kbps for the incoming traffic flow assigned to queue 6.	C	13
queue6-pir <0~1,000,000>	Sets the maximum bandwidth in Kbps for the incoming traffic flow assigned to queue 6.	C	13
queue7-cir <0~1,000,000>	Sets the guaranteed bandwidth in Kbps for the incoming traffic flow assigned to queue 7.	C	13
queue7-pir <0~1,000,000>	Sets the maximum bandwidth in Kbps for the incoming traffic flow assigned to queue 7.	C	13
interface port-channel <*port-list*>	Enters config-interface mode for the port(s).	C	13

Table 118 Rate Limit Command Summary (continued)

COMMAND	DESCRIPTION	M	P
ratelimit-profilename <*profile-name*>	Associates port(s) to the specified rate limit profile.	C	13
ratelimit-profilename per-queue <*profile-name*>	Associates port(s) to the specified per queue rate limit profile.	C	13
no ratelimit-profile <*profile-name*>	Unassociates port(s) to the specified rate limit profile.	C	13
no ratelimit-profile per-queue <*profile-name*>	Unassociates port(s) to the specified per queue rate limit profile.	C	13
no ratelimit-profile <*profile-name*>	Deletes the specified rate limit profile.	C	13
no ratelimit-profile per-queue <*profile-name*>	Deletes the specified per queue rate limit profile.	C	13
no ratelimit-profile per-queue all	Deletes all per queue rate limit profiles.	C	13

55.2 Command Examples

This example creates a rate limit profile that defines the incoming data rate limit (up to 1000 Kbps) and the egress data rate limit (up to 2000 Kbps).

```
sysname# config
sysname(config)# ratelimit-profile Test
sysname(config-ratelimitprofile)# ingress 1000
sysname(config-ratelimitprofile)# egress 2000
sysname(config-ratelimitprofile)# exit
sysname(config)# exit
sysname# write mem
sysname# show ratelimit-profile

  Name                            Ingress Egress  Applied Ports
  ================================================================================
  Test                            1000    2000
  DEFVAL                          0       0       1-17
```

This example associates ports 1, 2, 10, 11 and 12 to the rate limit profile. (Ports 3 to 9 and 13 to 17 use the default rate limit profile.

```
sysname(config)# interface port-channel 1,2,10-12
sysname(config-interface)# ratelimit-profile Test
sysname(config-interface)# exit
sysname(config)# exit
sysname# write mem
sysname# show ratelimit-profile

  Name                            Ingress Egress  Applied Ports
  ================================================================================
  Test                            1000    2000    1,2,10-12
  DEFVAL                          0       0       3-9,13-17
```

56

Remote CPE Device Commands

Use these commands to configure remote (CPE) devices connected to the Switch.

You have to use the `commit` command in each command group to save the settings in the command group to the CPE device.

56.1 Remote Firmware Upgrade

You can upgrade firmware on CPE devices that are connected to the Switch.

1. Get the latest CPE firmware file from www.zyxel.com, and save it on your computer.
2. Use FTP to upload the CPE firmware from your computer to the Switch, and rename the CPE firmware to "CPEImg". For example, enter "`put 100AWxxx.bin CPEImg`", where `100AWxxx.bin` is the original name of the CPE firmware. At the same time, you can view the status of the upload process via the console port as following.

```
recvCPEImage, size = 0x39767b
writeCPEImage, CPEbuffer = 0x16b3210, CPELen = 0x39767b
```

You must rename the CPE firmware to "CPEImg" on the Switch.

3. Use the `rmt-fw-upgrade port-channel <PORT-LIST>` command to transfer the CPE firmware from the Switch to the CPE device(s) connected to the specified port(s).

```
sysname# rmt-fw-upgrade port-channel 1
sysname# port 1:
        start ftp 128.0.2.201.................Success
        FWupgrade Done.
remote FW upgrade completed, free image.
```

4. After the remote CPE firmware upgrade, the Switch automatically deletes CPEImg, and the CPE device automatically restarts.

The CPE device(s) automatically restart after the upgrade, which will disrupt network connectivity for end users.

Repeat steps 1-4 to upgrade firmware for each CPE model. The Switch automatically detects and upgrades firmware to the appropriate CPE model.

If you upload CPE firmware to the Switch and decide not to use it to upgrade any CPE devices, run the `rmt-fw-upgrade release` command to delete the CPE firmware on the Switch. This frees up system memory.

56.2 Command Summary

The legal ranges of some input values depend on the CPE device that is connected to the Switch.

The following table describes user-input values available in multiple commands for this feature.

Table 119 rmt-vtur classification User-input Values (See Table 123 on page 206)

COMMAND	DESCRIPTION
index	1~8, this is a classifier rule's index number.

Table 120 rmt-vtur port-config User-input Values (See Table 129 on page 210)

COMMAND	DESCRIPTION
index	1~5, the CPE device port number. Ports 1~4 are the LAN ports, and port 5 is the VDSL port.

The following section lists the commands for this feature.

Table 121 rmt-fw-upgrade Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-fw-upgrade Auto-detect`	Sets the Switch to check the CPE firmware version and upgrade firmware automatically when the conenction to a CPE device is up. The Switch uses the firmware stored in CPEImg to upgrade the CPE device(s). Use FTP to load CPE firmware to CPEImg before you run this command.	E	13
`rmt-fw-upgrade FW-version <firmware-version>`	Sets the CPE firmware version after using FTP to load CPE firmware to the Switch.	E	13
`rmt-fw-upgrade Image_info`	Displays the CPE firmware version and model name.	E	13
`rmt-fw-upgrade Model <model-name>`	Sets the CPE firmware's model name after using FTP to load CPE firmware to the Switch.	E	13

Table 121 rmt-fw-upgrade Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`rmt-fw-upgrade port-channel <port-list>`	Upgrades firmware on CPE device(s) connected to the specified port(s). The Switch uses the firmware stored in CPEImg to upgrade the CPE device(s). Use FTP to load CPE firmware to CPEImg before you run this command. After a successful upgrade, the Switch deletes CPEImg, and the CPE device automatically restarts. Note: The CPE device automatically restarts after the upgrade.	E	13
`rmt-fw-upgrade release`	Deletes CPEImg (the CPE firmware file) on the Switch. This frees up system memory.	E	13

Table 122 rmt-vtur cfm-setup Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's CFM settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`cfm-setup action <0|3|5>`	`0`: Stores CFM setting changes in the Switch. `3`: Has the CPE initiate a loopback test to a CFM maintenance endpoint (MEP). `5`: Has the CPE load its CFM default settings.	E	13
`cfm-setup commit`	Saves the settings for this command group to the CPE device. Unlike other remote CPE commit commands, the CPE device will then apply the settings without restarting the system itself.	E	13
`cfm-setup destMac <mac-address>`	Sets the destination MAC address for a CFM loopback test. A *mac-address* example: 00:13:49:00:00:0A	E	13
`cfm-setup fetch-config`	Fetches current CFM settings and loopback test status counter from the remote CPE device. Then you have to use "`show cfm`" to view the result.	E	13
`cfm-setup lbcount <1~999>`	Sets the number of CFM loopback messages (1~999) the CPE device sends in a loopback test.	E	13
`cfm-setup ma-name <ma-name>`	Sets the CFM MA name for the remote CPE device. See Section 10.1 on page 49 for CFM term definitions. Note: At the time of writing, P870 series doesn't support this command.	E	13
`cfm-setup md-level <0~7>`	Sets the CFM MD Level for the remote CPE device.	E	13
`cfm-setup md-name <md-name>`	Sets the CFM MD name for the remote CPE device.	E	13
`cfm-setup mep-id <1~8191>`	Sets the CFM MEP ID for the remote CPE device.	E	13

Table 122 rmt-vtur cfm-setup Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`cfm-setup status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. `Fail`: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13
`cfm-setup vid <1~4094>`	Sets the CFM VLAN ID for the remote CPE device.	E	13
`show cfm`	Displays CFM settings for the remote CPE device. You can also use this command to see the CFM loopback test report on the CPE device.	E	13
`show cfm-setting`	Displays CFM settings for the remote CPE device. You can also use this command to see the CFM loopback test report on the CPE device.	E	13

Table 123 rmt-vtur classification Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's classifier settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`classification <index> 802.1p <0~7>`	Sets a priority level (0~7) with which the CPE replaces the IEEE 802.1 priority field in the packets which match the specified classification rule. Note: 802.1Q VLAN tagging should be enabled before running this command.	E	13
`classification <index> 802.1q <1~4094>`	Sets a VLAN ID number (0~4095) with which the CPE replaces the VLAN ID of the frames whcih match the specified classification rule.	E	13
`classification <index> Filter destIp <ip-address> mask <mask>`	Classifies packets with the specified destination IP address and subnet mask.	E	13
`classification <index> Filter destMAC <mac-address> mask <mask>`	Classifies packets with the specified destination MAC address and the mask.	E	13
`classification <index> Filter destPort start <port> end <port>`	Classifies packets with the specified destination starting port and ending port.	E	13
`classification <index> Filter lan <1~5|1~3>`	Classifies packets sent from a specified CPE's LAN port. When the virtual port function is enabled on the CPE device, enter 1~5 (1~4: LAN Ethernet ports, 5: wireless interface). When the virtual port function is disabled on the CPE device, enter 1~3 (1~2: for LAN Ethernet ports, 3: wireless interface).	E	13
`classification <index> Filter priority <0~7>`	Classifies packets tagged with the specified 802.1p priority level.	E	13

Table 123 rmt-vtur classification Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`classification <index> Filter protocol <TCP/UDP|TCP|UDP|ICMP>`	Classifies packets with the specified protocol.	E	13
`classification <index> Filter prtcl-type <0600-FFFF>`	Classifies packets with the specified protocol type.	E	13
`classification <index> Filter srcIp <ip-address> mask <mask>`	Classifies packets with the specified source IP address and subnet mask.	E	13
`classification <index> Filter srcMAC <mac-address> mask <mask>`	Classifies packets with the specified source MAC address and the mask.	E	13
`classification <index> Filter srcPort start <port> end <port>`	Classifies packets with the specified source starting port and ending port.	E	13
`classification <index> active <enable|disable>`	Activates or deactivates a classification rule.	E	13
`classification <index> delete`	Deletes an existing classification rule.	E	13
`classification <index> gateway <ip-address>`	Sets the gateway IP address for a WAN connection (in PPPoE or MER mode) for a classification rule.	E	13
`classification <index> queue <1~4>`	Assigns a CPE's queue (1~4) that applies to a classification rule.	E	13
`classification <index> wan <1~4>`	Assigns the CPE's WAN connection (1~4) through which to forward the traffic that matches this classification rule.	E	13
`classification commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`classification status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. `Fail`: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13
`show classification`	Displays classification rule settings for the remote CPE device.	E	13

Table 124 rmt-vtur lan-setting Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's LAN settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`lan-setting DHCP disable`	Disables DHCP server on the CPE device's LAN.	E	13

Table 124 rmt-vtur lan-setting Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`lan-setting DHCP enable <start-ip> <end-ip> <mask>`	Enables DHCP server on the CPE device's LAN and configures the DHCP starting and ending IP addresses and subnet mask.	E	13
`lan-setting DHCP relay ip <ip-address>`	Enables DHCP relay to have the CPE device's LAN forward DHCP requests to the specified DHCP server.	E	13
`lan-setting commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`lan-setting ip <ip-address> <mask>`	Enters the IP address and subnet mask for the remote CPE's LAN.	E	13
`lan-setting status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. `Fail`: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13
`show lan-setting`	Displays remote CPE LAN configuration.	E	13

Table 125 rmt-vtur layer2-setting Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's layer 2 settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`layer2-setting bcaststorm <0|1|2|3>`	Sets the rate at which the CPE device can send broadcast packets to the Switch. 0: Disable 1: 1500 or 15000 pps (depending on the CPE device) 2: 3000 or 30000 pps (depending on the CPE device) 3: 6000 or 60000 pps (depending on the CPE device)	E	13
`layer2-setting igmp-snooping <enable|disable>`	Activates or deactivates IGMP snooping on the CPE device.	E	13
`layer2-setting unknown-mcast <0|1>`	Specifies the action the CPE device performs when it receives an unknown multicast frame. 0: Drop unknown multicast frames. 1: Forward unknown multicast frames.	E	13
`layer2-setting vlan-type <802.1q|port-based>`	Specifies what type of VLAN the CPE device uses. `802.1q`: The CPE device uses IEEE 802.1Q tagged VLAN. `port-based`: The CPE device uses port-based VLAN.	E	13
`layer2-setting commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13

Table 125 rmt-vtur layer2-setting Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`layer2-setting status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. `Fail`: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13
`show layer2-setting`	Displays remote CPE layer2 configuration.	E	13

Table 126 rmt-vtur loopback Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands perform actions for the CPE device maintenance. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`loopback count <count> size <size>`	Performs a loopback test. You can also define the packet size (from 64 to 1518 bytes) and how many times the Switch sends the loopback messages in a test.	E	13
`show loopback`	Displays the loopback test results.	E	13

Table 127 rmt-vtur mnt Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands perform actions for the CPE device maintenance. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`mnt clear-counter`	Removes all counters for the CPE device.	E	13
`mnt commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`mnt console active`	Enables multiple user login (using the admin and user accounts) through the CPE device's console port.	E	13
`mnt console admin <password>`	Sets a new admin password (up to 16 ASCII characters) for the CPE device.	E	13
`mnt console user <password>`	Sets a new user password (up to 16 ASCII characters) for the CPE device.	E	13
`mnt load-default`	Resets the CPE device to the factory defaults.	E	13
`mnt reinit`	Reloads the configuration from the Switch to the CPE device.	E	13

Table 127 rmt-vtur mnt Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`mnt reset`	Resets the CPE device to the factory defaults and reboots the CPE device. This is equivalent to pushing the **RESET** button.	E	13
`mnt status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. `Fail`: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13

Table 128 rmt-vtur port-based Command Summary

COMMAND	DESCRIPTION	M	P
`show port-based`	These settings have no effect unless the `layer2-setting vlan-type` is `port-based`. Displays the port-based VLAN settings on the CPE device.	E	13
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's port-based VLAN settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`port-based port-index <1-4> member <port-list>`	Assigns the specified member ports to the specified port-based VLAN.	E	13
`port-based commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`port-based status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. `Fail`: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13

Table 129 rmt-vtur port-config Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's port settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`port-config <index> adminstate <up|down>`	Enables (up) or disables (down) the specified CPE device port.	E	13
`port-config <index> defpri <0~7>`	Sets the default IEEE 802.1p priority for outgoing traffic on the specified CPE device port.	E	13
`port-config <index> flowctrl <enable|disable>`	Activates or deactivates flow control on the specified CPE device port.	E	13

Table 129 rmt-vtur port-config Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`port-config <index> pvid <1~4094>`	Sets the default VLAN ID for outgoing traffic on the specified CPE device port.	E	13
`port-config <index> speed <auto|10H|10F|100H|100F>`	Sets the speed and duplex of the specified CPE device port.	E	13
`port-config commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`port-config status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. `Fail`: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13

Table 130 rmt-vtur queuemapping Command Summary

COMMAND	DESCRIPTION	M	P
`show queuemapping`	Displays the priority queue mapping on the CPE device.	E	13
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's queue settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`queuemapping level <0~7> queue <0~3>`	Sets the specified priority queue for the specified IEEE 802.1p priority level. The number of priority queues depends on the CPE device.	E	13
`queuemapping commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`queuemapping status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. `Fail`: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13

Table 131 rmt-vtur remotefunc Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's remote management settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`remotefunc <snmp|ssh|tftp|telnet|web> active <0:Off|1:ALL On|2:LAN On|3:WAN On>`	Sets Remote SNMP, SSH, TFTP, Telnet or Web settings for the remote CPE device. Set `0` (`ALL Off`) to disallow any access to the device through a specific protocol. Set `1` (`ALL On`) to allow access to the device from both the CPE device's LAN and WAN networks through a specific protocol. Set 2 (`LAN On`) to allow access to the device from the CPE device's LAN network through a specific protocol. Set 3 (`WAN On`) to allow access to the device from the CPE device's WAN network through a specific protocol.	E	13
`remotefunc Wireless active <0:Off|1:On>`	Enables or disables the wireless LAN on the CPE device.	E	13
`remotefunc commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`remotefunc status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. Fail: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13
`show RemoteFunc`	Displays the remote management settings for the CPE device.	E	13

Table 132 rmt-vtur show Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands display CPE device status. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`show consoleSetting`	Displays the console port settings for the CPE device.	E	13
`show general`	Displays packet statistics for the CPE device.	E	13
`show linkInitStatus`	Displays whether or not the link with the CPE device has been initialized. `Success`: The Switch has a link to the CPE device. `In-Progress`: The Switch is initializing the connection to the CPE device. `Fail`: The Switch was unable to establish a link to the CPE device.	E	13

Table 132 rmt-vtur show Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`show MacTable`	Displays the MAC table on the CPE device.	E	13
`show portstatus`	Displays the status of the port on the CPE device.	E	13

Table 133 rmt-vtur vlan1q Command Summary

COMMAND	DESCRIPTION	M	P
`show vlan1q`	These settings have no effect unless the `layer2-setting vlan-type` is `802.1q`. Displays IEEE 802.1Q settings on the CPE device.	E	13
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's 802.1Q VLAN settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`vlan1q vid <1~4094> egress <port-list>`	Sets the VLAN ID for outgoing traffic from the specified CPE device port(s).	E	13
`vlan1q vid <1~4094> untag <port-list>`	Removes the VLAN tag for outgoing traffic from the specified CPE device port(s).	E	13
`no vlan1q vid <1~4094>`	Removes the specified VLAN on the CPE device. Any CPE device ports that were adding this VLAN ID to outgoing traffic become untagged ports.	E	13
`vlan1q commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`no vlan1q commit`	Does not apply the settings for this command group to the CPE device.	E	13
`vlan1q status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. Fail: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13

Table 134 rmt-vtur wan-common Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's WAN common settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`wan-common QoS <enable|disable>`	Enables or disables QoS on the CPE's WAN.	E	13
`wan-common autoGateway <enable|disable>`	Enables or disables the automatic obtaining of a gateway IP address from the CPE's ISP.	E	13

Table 134 rmt-vtur wan-common Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`wan-common commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`wan-common defaultGateway <ip-address>`	Sets the default gateway IP address for the CPE's WAN.	E	13
`wan-common status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. Fail: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13
`wan-common virtual-port <enable|disable>`	Enables or disables virtual port on the CPE's WAN.	E	13

Table 135 rmt-vtur wan-entry Command Summary

COMMAND	DESCRIPTION	M	P
`rmt-vtur port-channel <port>`	Enters remote CPE configuration mode on the specified port. The following commands configure the CPE's WAN settings. Note: Make sure the link is up between the port and the connected CPE device before running this command.	E	13
`wan-entry <1~4> Firewall <enable|disable>`	Enables or disables the firewall on a remote WAN connection. Note: The WAN connection should be in PPPoE or MER (MAC Encapsulated Routing) mode before running this command.	E	13
`wan-entry <1~4> IGMP <enable|disable>`	Enables or disables IGMP on a remote WAN connection. Note: The WAN connection should be in PPPoE or MER mode before running this command.	E	13
`wan-entry <1~4> MER <enable|disable>`	Enables or disables MER settings on a remote WAN connection. MAC Encapsulated Routing (MER) is an encapsulation protocol that formats IP packets so that they can be understood in a bridge network. For instance, it encapsulates routed Ethernet frames into bridged Ethernet cells. MER requires that you specify a gateway IP address.	E	13
`wan-entry <1~4> MER DHCP <enable|disable>`	Sets the WAN connection as a DHCP client or turn it off.	E	13
`wan-entry <1~4> MER ip <address> mask <mask>`	Sets the IP address and subnet mask for the WAN connection if you disable the DHCP client feature.	E	13
`wan-entry <1~4> PPPoE <enable|disable>`	Enables or disables PPPoE settings on a remote WAN connection.	E	13
`wan-entry <1~4> PPPoE Password <password>`	Sets the password (up to 16 ASCII characters) for PPPoE authentication.	E	13

Table 135 rmt-vtur wan-entry Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`wan-entry <1~4> PPPoE UserName <username>`	Sets the user name (up to 32 ASCII characters) for PPPoE authentication.	E	13
`wan-entry <1~4> active <enable|disable>`	Enables or disables a WAN connection on the remote CPE device.	E	13
`wan-entry <1~4> delete`	Deletes a remote WAN connection.	E	13
`wan-entry <1~4> nat <enable|disable>`	Enables or disables NAT on a remote WAN connection. Note: The WAN connection should be in PPPoE or MER mode before running this command.	E	13
`wan-entry <1~4> vlantagging autovlan`	Enables auto VLAN on a remote WAN connection. Auto VLAN has the CPE device use its QoS classification rules to automatically assign traffic a VLAN ID number and priority level.	E	13
`wan-entry <1~4> vlantagging disable`	Disables 802.1Q VLAN tagging on a remote WAN connection.	E	13
`wan-entry <1~4> vlantagging vlanmux vid <1~4094> 802.1p <0~7>`	Enables VLAN Mux on a remote WAN connection. VLAN Mux allows multiplexing of multiple protocols over a single ATM virtual circuit and add the specified VLAN ID and 802.1p priority level to traffic flowing through this WAN connection.	E	13
`wan-entry <1~4> wan-protocol <PPPoE|MER|bridge>`	Sets the protocol type on a remote WAN connection.	E	13
`wan-entry commit`	Saves the settings for this command group to the CPE device. Then the CPE device will restart itself automatically to apply the settings.	E	13
`wan-entry status`	Checks the command status for this command group. `OK`: The Switch successfully applied commands in this command group to the CPE device. Fail: The Switch was unable to apply commands in this command group to the CPE device. `Pending`: The Switch is trying to apply commands in this command group to the CPE device.	E	13

56.3 Command Examples

This example looks at the current status of the ports on the CPE device.

The command output may vary depending on the switch models.

```
sysname(config-RmtVtur)# show portstatus
  Port      1 status:
  N/A       N/A       Queue 0   Pvid 1
  Port      2 status:
  N/A       N/A       Queue 0   Pvid 1
  Port      3 status:
  100M/Full Disable   Queue 0   Pvid 1
  Port      4 status:
  N/A       N/A       Queue 0   Pvid 1
```

The following table describes the labels in this screen.

Table 136 rmt-vtur port-channel <port-list> show portstatus

LABEL	DESCRIPTION
Speed-Duplex	This field displays the speed and duplex setting on this port.
Flow Control	This field displays whether or not flow control is enabled on this port.
Queue	This field displays the priority queue used by traffic on this port.
Pvid	This field displays the PVID of this port.

This example looks at the current status of the ports on the CPE device.

This example is for the VES16XX-FA series only.

```
sysname# enable
sysname# rmt-vtur port-channel 2
sysname(config-RmtVtur)# show portstatus
  Port   status   curspeed   AdminStatus   SpeedDuplex
   1     DOWN     -----        Enable          AUTO
   2     DOWN     -----        Enable          AUTO
   3     DOWN     -----        Enable          AUTO
   4     UP       100M/FULL    Enable          AUTO
   6              VDSL         Enable          AUTO
```

The following table describes the labels in this screen.

Table 137 rmt-vtur port-channel <port> show portstatus

LABEL	DESCRIPTION
Port	This field displays the CPE's port numbers.
status	This field displays the port status (`UP` or `DOWN`).
curspeed	This field displays the speed and duplex setting on Ethernet ports. It also displays the port type (for example, `VDSL`) for non-Ethernet ports.

Table 137 rmt-vtur port-channel <port> show portstatus (continued)

LABEL	DESCRIPTION
AdminStatus	This field displays whether a port is enabled or not.
SpeedDuplex	This field displays whether the speed and duplex modes on a port are set through auto-negotiate (AUTO) or not.

56.4 Command Example - Remote CPE's CFM Set Up

This example shows the procedure to configure the CFM settings and initialize a CFM loopback test for a remote CPE device.

1 Fetch and display the current CFM settings on the remote CPE device which is connecting to VDSL port 2.

```
sysname# enable
sysname# rmt-vtur port-channel 2
sysname(config-RmtVtur)# cfm-setup fetch-config
sysname(config-RmtVtur)# show cfm
  CFM Action      :0
  Loopback Count  :0
  MD Name         :
  MD level        :
  MA Name         :
  MEP id          :
  Vlan id         :0
  Dest MAC        :00:00:00:00:00:00
  Inorder LBR     :0
  Outorder LBR    :0
  Sent LBM        :0
```

The following table describes the labels in this screen.

Table 138 show https session

LABEL	DESCRIPTION
CFM Action	This field displays the CFM action configured for the remote CPE device.
Loopback Count	This field displays number of loopback test messages will be sent in a test configured for the remote CPE device.
MD Name	This field displays the maintenance domain name configured for or fetched from the remote CPE device.
MA Name	This field displays the maintenance domain name configured for the remote CPE device.
MEP id	This field displays the maintenance endpoint ID configured for or fetched from the remote CPE device.
Vlan id	This field displays the CFM VLAN ID configured for or fetched from the remote CPE device.
Dest MAC	This field displays the destination MAC address for the CFM loopback test configured for the remote CPE device.
Inorder LBR	This field displays the number of in-order loopback response (LBR) messages the remote CPE device received in the last loopback test.

Table 138 show https session (continued)

LABEL	DESCRIPTION
Outorder LBR	This field displays the number of out-of-order loopback response (LBR) messages the remote CPE device received in the last loopback test. The higher number of this field might becuase of fault connectivities between the CPE device and the destination host.
Sent LBM	This field displays the number of accumulated loopback messages (LBMs) the remote CPE device sent in loopback tests since it last started up.

2 Check the command status for the cfm-setup commands first. Make sure the Switch can successfully apply cfm-setup commands to the CPE device (should reply “OK”).

```
sysname(config-RmtVtur)# cfm-setup status
  MaintenanceSetup               status: OK
```

3 Configure the following CFM settings and then save the settings into the Switch’s flash (`action 0`).

- Maintenance domain (MD) name: MD1
- MD level: 1
- Maintenance Association (MA) name: MA1
- MA VLAN ID: 1
- MEP ID: 100

```
sysname(config-RmtVtur)# cfm-setup md-name MD1
sysname(config-RmtVtur)# cfm-setup md-level 1
sysname(config-RmtVtur)# cfm-setup ma-name MA1
sysname(config-RmtVtur)# cfm-setup vid 1
sysname(config-RmtVtur)# cfm-setup mep-id 100
sysname(config-RmtVtur)# cfm-setup action 0
```

4 Configure the following CFM loopback test settings, display what you have configured, and then have the CPE device initiate the test.

- Number of loopback test messages sent in a loopback test: 500
- Destination MAC address: 00:13:49:00:00:0A

- CFM action: loopback test (`action 3`)

```
sysname(config-RmtVtur)# cfm-setup lbcount 500
sysname(config-RmtVtur)# cfm-setup destMac 00:13:49:00:00:0A
sysname(config-RmtVtur)# cfm-setup action 3
sysname(config-RmtVtur)# show cfm
  CFM Action      :3
  Loopback Count  :500
  MD Name         :MD1
  MD level        :1
  MA Name         :MA1
  MEP id          :100
  Vlan id         :1
  Dest MAC        :00:13:49:00:00:0A
  Inorder LBR     :0
  Outorder LBR    :0
  Sent LBM        :0
sysname(config-RmtVtur)# cfm-setup commit
```

5 Wait until the CPE completes the loopback test (around 2 minutes), fetch the CPE status and you can view the test report by using the "`show cfm`" command.

```
sysname(config-RmtVtur)# cfm-setup fetch-config
sysname(config-RmtVtur)# show cfm
  CFM Action      :0
  Loopback Count  :0
  MD Name         :MD1
  MD level        :1
  MA Name         :0
  MEP id          :100
  Vlan id         :1
  Dest MAC        :00:00:00:00:00:00
  Inorder LBR     :499
  Outorder LBR    :1
  Sent LBM        :500
```

56.5 Command Example - Set VLAN Mux for 4 WANs on a CPE device

This example shows the procedure to set VLAN Mux on 4 WAN connections on a remote CPE device which is connecting to the Switch's port 2.

This example classifies traffic flowing through different incoming LANs to determine which WAN connection goes through. Then the CPE device applies the corresponding VLAN ID, priority level, and classfication rule to the traffic. See the settings used in this example.

Table 139 VLAN Mux for 4 WANs Example Settings

WAN CONNECTION	VLAN ID	PRIORITY LEVEL	CLASSIFICATION RULE	CLASSIFICATION CRITERIA
1	10	1	1	classify traffic flowing through LAN1
2	20	2	2	classify traffic flowing through LAN2

Table 139 VLAN Mux for 4 WANs Example Settings

WAN CONNECTION	VLAN ID	PRIORITY LEVEL	CLASSIFICATION RULE	CLASSIFICATION CRITERIA
3	30	3	3	classify traffic flowing through LAN3
4	40	4	4	classify traffic flowing through LAN4

1 Display current WAN information. By default, only WAN 1 is enabled. It is set to bridge mode.

```
sysname# enable
sysname# rmt-vtur port-channel 2
sysname(config-RmtVtur)# show wan-entry
  1 wan interfaces
  index           :1
  service         :ENABLE
  vlan tagging    :DISABLE
    vlan Id       :-1
    802.1p        :0
  protocol        :Bridge
```

2 Globally enable QoS on the CPE device's WAN.

```
sysname(config-RmtVtur)# wan-common QoS enable
```

3 Globally enable virtual port on the CPE device's WAN.

```
sysname(config-RmtVtur)# wan-common virtual-port enable
```

4 Add WAN connections 2~3 and set them all to bridge mode. Then display the results.

```
sysname(config-RmtVtur)# wan-entry 2 wan-protocol bridge
sysname(config-RmtVtur)# wan-entry 3 wan-protocol bridge
sysname(config-RmtVtur)# wan-entry 4 wan-protocol bridge
sysname(config-RmtVtur)# show wan-entry
  4 wan interfaces
  index           :1
  service         :ENABLE
  vlan tagging    :DISABLE
    vlan Id       :-1
    802.1p        :0
  protocol        :Bridge

  index           :2
  service         :DISABLE
  vlan tagging    :DISABLE
    vlan Id       :-1
    802.1p        :-1
  protocol        :Bridge

  index           :3
  service         :DISABLE
  vlan tagging    :DISABLE
    vlan Id       :-1
    802.1p        :-1
  protocol        :Bridge

  index           :4
  service         :DISABLE
  vlan tagging    :DISABLE
    vlan Id       :-1
    802.1p        :-1
  protocol        :Bridge
```

5 Enable VLAN Mux and set the VLAN ID and priority level for each WAN connection.

```
sysname(config-RmtVtur)# wan-entry 1 vlantagging vlanmux vid 10 802.1p 1
sysname(config-RmtVtur)# wan-entry 2 vlantagging vlanmux vid 20 802.1p 2
sysname(config-RmtVtur)# wan-entry 3 vlantagging vlanmux vid 30 802.1p 3
sysname(config-RmtVtur)# wan-entry 4 vlantagging vlanmux vid 40 802.1p 4
```

6 Enable classification rules.

```
sysname(config-RmtVtur)# classification 1 active enable
sysname(config-RmtVtur)# classification 2 active enable
sysname(config-RmtVtur)# classification 3 active enable
sysname(config-RmtVtur)# classification 4 active enable
```

7 Assign a WAN connection for each classification rule.

```
sysname(config-RmtVtur)# classification 1 wan 1
sysname(config-RmtVtur)# classification 2 wan 2
sysname(config-RmtVtur)# classification 3 wan 3
sysname(config-RmtVtur)# classification 4 wan 4
```

8 Assign a queue for each classification rule.

```
sysname(config-RmtVtur)# classification 1 queue 1
sysname(config-RmtVtur)# classification 2 queue 2
sysname(config-RmtVtur)# classification 3 queue 3
sysname(config-RmtVtur)# classification 4 queue 4
```

9 Define classification criteria (traffic flowing through which LAN port) for each classification rule. For example, traffic flowing through the CPE device's LAN 1 will be classified to use classification rule 1.

```
sysname(config-RmtVtur)# classification 1 Filter lan 1
        current filter set to be IP level, IEEE 802.1p related filter
cleared for rule 1
sysname(config-RmtVtur)# classification 2 Filter lan 2
        current filter set to be IP level, IEEE 802.1p related filter
cleared for rule 2
sysname(config-RmtVtur)# classification 3 Filter lan 3
        current filter set to be IP level, IEEE 802.1p related filter
cleared for rule 3
sysname(config-RmtVtur)# classification 4 Filter lan 4
        current filter set to be IP level, IEEE 802.1p related filter
cleared for rule 4
```

10 Save the classification settings to the remote CPE device.

```
sysname(config-RmtVtur)# classification commit
```

56.6 Command Example - Set Auto VLAN for 1 WAN on a CPE device

This example shows the procedure to set auto VLAN on the WAN 1 connection on a remote CPE device which is connected to the Switch's port 2.

In this example, we want to add different VLAN and priority tags to traffic depending on the WAN connection through which the traffic flows. See the settings used in this example.

Table 140 Auto VLAN for 1 WAN Example Settings

WAN CONNECTIONS	VLAN ID	PRIORITY LEVEL	CLASSIFICATION RULE	CLASSIFICATION CRITERIA
1	10	1	1	classify traffic flowing through LAN1
1	20	2	2	classify traffic flowing through LAN2
1	30	3	3	classify traffic flowing through LAN3
1	40	4	4	classify traffic flowing through LAN4

See the similar procedures in the Section 56.5 on page 219. Use the following command to globally enable auto VLAN tagging instead of adding WANs and enabling VLAN Mux in the example's steps 4 and 5).

```
sysname(config-RmtVtur)# wan-entry 1 vlantagging autovlan
```

57

Remote Management Commands

Use these commands to specify a group of one or more “trusted computers” from which an administrator may use one or more services to manage the Switch.

57.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 141 remote-management User-input Values

COMMAND	DESCRIPTION
index	1-4.

The following section lists the commands for this feature.

Table 142 remote-management Command Summary

COMMAND	DESCRIPTION	M	P
`show remote-management [index]`	Displays all secured client information or, optionally, a specific group of secured clients.	E	13
`remote-management <index>`	Enables the specified group of trusted computers.	C	13
`no remote-management ALL`	Disables all groups of trusted computers.	C	13
`no remote-management <index>`	Disables the specified group of trusted computers.	C	13
`remote-management <index> start-addr <ip-address> end-addr <ip-address> service <[telnet] [ftp] [http] [icmp] [snmp] [ssh] [https]>`	Specifies a group of trusted computer(s) from which an administrator may use the specified service(s) to manage the Switch. Group `0.0.0.0 - 0.0.0.0` refers to every computer.	C	13
`no remote-management <index> service <[telnet] [ftp] [http] [icmp] [snmp] [ssh] [https]>`	Disables the specified service(s) for the specified group of trusted computes.	C	13

57.2 Command Examples

This example allows computers in subnet 172.1.1.0/24 to access the Switch through any service except SNMP, allows the computer at 192.168.10.1 to access the Switch only through SNMP, and prevents other computers from accessing the Switch at all. The last one is accomplished by overwriting the default entry (index 1).

```
sysname# configure
sysname(config)# remote-management 1 start-addr 172.1.1.0 end-addr
--> 172.1.1.255 service telnet ftp http icmp ssh https
sysname(config)# remote-management 2 start-addr 192.168.10.1 end-addr
--> 192.168.10.1 service snmp
sysname(config)# exit
```

58

Running Configuration Commands

Use these commands to back up and restore configuration and firmware.

58.1 Switch Configuration File

When you configure the Switch using either the CLI (Command Line Interface) or Web Configurator, the settings are saved as a series of commands in a configuration file on the Switch called `running-config`. You can perform the following with a configuration file:

- Back up Switch configuration once the Switch is set up to work in your network.
- Restore a previously-saved Switch configuration.
- Use the same configuration file to set all switches (of the same model) in your network to the same settings.

You may also edit a configuration file using a text editor. Make sure you use valid commands.

The Switch rejects configuration files with invalid or incomplete commands.

58.2 Command Summary

The following section lists the commands for this feature.

Table 143 running-config Command Summary

COMMAND	DESCRIPTION	M	P
`copy running-config interface port-channel <port> <port-list> [<attribute> [<...>]]`	Clones (copies) the attributes from the specified port to other ports. Optionally, copies the specified attributes from one port to other ports.	E	13
`erase running-config`	Resets the Switch to the factory default settings.	E	13
`erase running-config interface port-channel <port-list> [<attribute> [<...>]]`	Resets to the factory default settings on a per-port basis and optionally on a per-feature configuration basis.	E	13
`erase running-config help`	Provides more information about the specified command.	E	13

Table 143 running-config Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`show running-config [page]`	Displays the current configuration file. This file contains the commands that change the Switch's configuration from the default settings to the current configuration. Optionally, displays current operating configuration page by page.	E	13
`show running-config help`	Provides more information about the specified command.	E	3
`show running-config interface port-channel <port-list> [<attribute> [<...>]]`	Displays current configuration on a port-by-port basis.	E	3

58.3 Command Examples

This example resets the Switch to the factory default settings.

```
sysname# erase running-config
sysname# write memory
```

This example copies all attributes of port 1 to port 2 and copies selected attributes (active, bandwidth limit and STP settings) from port 1 to ports 5-8

```
sysname# copy running-config interface port-channel 1 2
sysname# copy running-config interface port-channel 1 5-8 active
bandwidth-limit spanning-tree
```

See Section 3.6 on page 25 for an example of `show running-config`.

59

Service Control Commands

Use these commands to decide what services you may use to access the Switch.

59.1 Command Summary

The following section lists the commands for this feature.

Table 144 service-control Command Summary

COMMAND	DESCRIPTION	M	P
`show service-control`	Displays service control settings.	E	13
`service-control ftp <socket-number>`	Allows FTP access on the specified service port.	C	13
`no service-control ftp`	Disables FTP access to the Switch.	C	13
`service-control http <socket-number>`	Allows HTTP access on the specified service port.	C	13
`service-control http <socket-number> <timeout>`	Allows HTTP access on the specified service port and sets the number of seconds the Switch has to wait before disconnecting an inactivity HTTP connection.	C	13
`no service-control http`	Disables HTTPS access to the Switch.	C	13
`service-control https <socket-number>`	Allows HTTPS access on the specified service port.	C	13
`no service-control https`	Disables HTTPS access to the Switch.	C	13
`service-control icmp`	Allows ICMP management packets.	C	13
`no service-control icmp`	Disables ICMP access to the Switch.	C	13
`service-control snmp`	Allows SNMP management.	C	13
`no service-control snmp`	Disables SNMP access to the Switch.	C	13
`service-control ssh <socket-number>`	Allows SSH access on the specified service port.	C	13
`no service-control ssh`	Disables SSH access to the Switch.	C	13
`service-control telnet <socket-number>`	Allows Telnet access on the specified service port.	C	13
`no service-control telnet`	Disables Telnet access to the Switch.	C	13

59.2 Command Examples

This example disables all SNMP and ICMP access to the Switch.

```
sysname# configure
sysname(config)# no service-control snmp
sysname(config)# no service-control icmp
sysname(config)# exit
```

60

SNMP Server Commands

Use these commands to configure SNMP on the Switch.

60.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 145 snmp-server User-input Values

COMMAND	DESCRIPTION
property	1-32 alphanumeric characters
options	authentication: `auth`, `radius`. interface: `linkup`, `linkdown`, `autonegotiation`. ip: `ping`, `traceroute`. switch: `stp`, `mactable`, `rmon`. system: `coldstart`, `warmstart`, `reset`, `timesync`, `externalalarm`. vdsl: `alarmprofile`.

The following section lists the commands for this feature.

Table 146 snmp-server Command Summary

COMMAND	DESCRIPTION	M	P
`show snmp-server`	Displays SNMP settings.	E	13
`snmp-server [contact <system-contact>] [location <system-location>]`	Sets the geographic location and the name of the person in charge of this Switch. *system-contact*: 1-32 English keyboard characters; spaces are allowed. *system-location*: 1-32 English keyboard characters; spaces are allowed.	C	13
`snmp-server get-community <property>`	Sets the get community. Only for SNMPv2c or lower.	C	13
`snmp-server set-community <property>`	Sets the set community. Only for SNMPv2c or lower.	C	13
`snmp-server trap-community <property>`	Sets the trap community. Only for SNMPv2c or lower.	C	13

Table 146 snmp-server Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`snmp-server username <name> sec-level <noauth |auth|priv> [auth <md5|sha>][priv <des|aes>]`	Sets the authentication level for SNMP v3 user authentication. Optionally, specifies the authentication and encryption methods for communication with the SNMP manager. *name*: Must match an existing account on the Switch. `noauth`: Use the username as the password string sent to the SNMP manager. This is equivalent to the Get, Set and Trap Community in SNMP v2c. This is the lowest security level. `auth`: Implement an authentication algorithm for SNMP messages sent by this user. `priv`: Implement authentication and encryption for SNMP messages sent by this user. This is the highest security level. Note: The settings on the SNMP manager must be set at the same security level or higher than the security level settings on the Switch.	C	13
`snmp-server version <v2c|v3|v3v2c>`	Sets the SNMP version to use for communication with the SNMP manager.	C	13

Table 147 snmp-server trap-destination Command Summary

COMMAND	DESCRIPTION	M	P
`snmp-server trap-destination <ip-address>`	Sets the IP addresses of up to four SNMP managers (stations to send your SNMP traps to). You can configure up to four managers.	C	13
`no snmp-server trap-destination <ip-address>`	Deletes the specified SNMP manager.	C	13
`snmp-server trap-destination <ip-address> enable traps`	Enables sending SNMP traps to a manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps`	Disables sending SNMP traps to a manager.	C	13
`snmp-server trap-destination <ip-address> enable traps authentication`	Sends all authentication traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps aaa`	Sends all authentication traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps authentication`	Prevents the Switch from sending any authentication traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps aaa`	Prevents the Switch from sending any authentication traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps authentication <options>`	Sends the specified authentication traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps aaa <options>`	Sends the specified authentication traps to the specified manager.	C	13

Table 147 snmp-server trap-destination Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no snmp-server trap-destination <ip-address> enable traps authentication <options>`	Prevents the Switch from sending the specified authentication traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps aaa <options>`	Prevents the Switch from sending the specified authentication traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps interface`	Sends all interface traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps interface`	Prevents the Switch from sending any interface traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps interface <options>`	Sends the specified interface traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps interface <options>`	Prevents the Switch from sending the specified interface traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps ip`	Sends all IP traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps ip`	Prevents the Switch from sending any IP traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps ip <options>`	Sends the specified IP traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps ip <options>`	Prevents the Switch from sending the specified IP traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps switch`	Sends all switch traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps switch`	Prevents the Switch from sending any switch traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps switch <options>`	Sends the specified switch traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps switch <options>`	Prevents the Switch from sending the specified switch traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps system`	Sends all system traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps system`	Prevents the Switch from sending any system traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps system <options>`	Sends the specified system traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps system <options>`	Prevents the Switch from sending the specified system traps to the specified manager.	C	13

Table 147 snmp-server trap-destination Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`snmp-server trap-destination <ip-address> enable traps vdsl`	Sends all VDSL traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps vdsl`	Prevents the Switch from sending any VDSL traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps vdsl <options>`	Sends the specified VDSL traps to the specified manager.	C	13
`no snmp-server trap-destination <ip-address> enable traps vdsl <options>`	Prevents the Switch from sending the specified VDSL traps to the specified manager.	C	13
`snmp-server trap-destination <ip-address> enable traps help`	Provides more information about the specified command.	C	13

61

SSH Commands

Use these commands to configure SSH on the Switch.

61.1 Command Summary

The following section lists the commands for this feature.

Table 148 ssh Command Summary

COMMAND	DESCRIPTION	M	P
`show ssh`	Displays general SSH settings.	E	13
`show ssh known-hosts`	Displays known SSH hosts information.	E	13
`show ssh key <rsa1|rsa|dsa>`	Displays internal SSH public and private key information.	E	13
`show ssh session`	Displays current SSH session(s).	E	13
`no ssh key <rsa1|rsa|dsa>`	Disables the secure shell server encryption key. Your Switch supports SSH versions 1 and 2 using RSA and DSA authentication.	C	13
`ssh known-hosts <host-ip> <1024|ssh-rsa|ssh-dsa> <key>`	Adds a remote host to which the Switch can access using SSH service.	C	13
`no ssh known-hosts <host-ip>`	Removes the specified remote hosts from the list of all known hosts.	C	13
`no ssh known-hosts <host-ip> <1024|ssh-rsa|ssh-dsa>`	Removes the specified remote hosts with the specified public key (1024-bit RSA1, RSA or DSA).	C	13
`ssh <1|2> <[user@]dest-ip> [command </>]`	Connects to an SSH server with the specified SSH version and, optionally, addition commands to be executed on the server.	E	0

61.2 Command Examples

This example disables the secure shell RSA1 encryption key and removes remote hosts 172.165.1.8 and 172.165.1.9 (with an SSH-RSA encryption key) from the list of known hosts.

```
sysname(config)# no ssh key rsa1
sysname(config)# no ssh known-hosts 172.165.1.8
sysname(config)# no ssh known-hosts 172.165.1.9 ssh-rsa
```

This example shows the general SSH settings.

```
sysname# show ssh
Configuration
    Version              : SSH-1 & SSH-2 (server & client), SFTP (server)
    Server                : Enabled
    Port                  : 22
    Host key bits         : 1024
    Server key bits       : 768
    Support authentication: Password
    Support ciphers       : AES, 3DES, RC4, Blowfish, CAST
    Support MACs          : MD5, SHA1
    Compression levels    : 1~9

Sessions:
   Proto Serv Remote IP       Port Local IP        Port   Bytes In Bytes
Out
```

The following table describes the labels in this screen.

Table 149 show ssh

LABEL	DESCRIPTION
Configuration	
Version	This field displays the SSH versions and related protocols the Switch supports.
Server	This field indicates whether or not the SSH server is enabled.
Port	This field displays the port number the SSH server uses.
Host key bits	This field displays the number of bits in the Switch's host key.
Server key bits	This field displays the number of bits in the SSH server's public key.
Support authentication	This field displays the authentication methods the SSH server supports.
Support ciphers	This field displays the encryption methods the SSH server supports.
Support MACs	This field displays the message digest algorithms the SSH server supports.
Compression levels	This field displays the compression levels the SSH server supports.
Sessions	This section displays the current SSH sessions.
Proto	This field displays the SSH protocol (SSH-1 or SSH-2) used in this session.
Serv	This field displays the type of SSH state machine (SFTP or SSH) in this session.
Remote IP	This field displays the IP address of the SSH client.
Port	This field displays the port number the SSH client is using.
Local IP	This field displays the IP address of the SSH server.
Port	This field displays the port number the SSH server is using.
Bytes In	This field displays the number of bytes the SSH server has received from the SSH client.
Bytes Out	This field displays the number of bytes the SSH server has sent to the SSH client.

62

Static Multicast Commands

Use these commands to tell the Switch how to forward specific multicast frames to specific port(s).

62.1 Command Summary

The following section lists the commands for this feature.

Table 150 multicast-forward Command Summary

COMMAND	DESCRIPTION	M	P
`show mac address-table multicast`	Displays the multicast MAC address table.	E	3
`multicast-forward name <name> mac <multicast-mac-address> vlan <vlan-id> inactive`	Creates a new static multicast forwarding rule. The rule name can be up to 32 printable ASCII characters. *multicast-mac-address*: Enter a multicast MAC address which identifies the multicast group. The last binary bit of the first octet pair in a multicast MAC address must be 1. For example, the first octet pair 00000001 is 01 and 00000011 is 03 in hexadecimal, so 01:00:5e:00:00:0A and 03:00:5e:00:00:27 are valid multicast MAC addresses. *vlan-id*: A VLAN identification number. Note: Static multicast addresses do not age out.	C	13
`multicast-forward name <name> mac <mac-address> vlan <vlan-id> interface port-channel <port-list>`	Associates a static multicast forwarding rule with specified port(s) within a specified VLAN.	C	13
`no multicast-forward mac <mac-address> vlan <vlan-id>`	Removes a specified static multicast rule.	C	13
`no multicast-forward mac <mac-address> vlan <vlan-id> inactive`	Activates a specified static multicast rule.	C	13

62.2 Command Examples

This example shows the current multicast table. The **Type** field displays **User** for rules that were manually added through static multicast forwarding or displays **System** for rules the Switch has automatically learned through IGMP snooping.

```
sysname# show mac address-table multicast
  MAC Address       VLAN ID   Type      Port
01:02:03:04:05:06   1         User      1-2
01:02:03:04:05:07   2         User      2-3
01:02:03:04:05:08   3         User      1-12
01:02:03:04:05:09   4         User      9-12
01:a0:c5:aa:aa:aa   1         System    1-12
```

This example removes a static multicast forwarding rule with multicast MAC address (01:00:5e:06:01:46) which belongs to VLAN 1.

```
sysname# no multicast-forward mac 01:00:5e:06:01:46 vlan 1
```

This example creates a static multicast forwarding rule. The rule forwards frames with destination MAC address 01:00:5e:00:00:06 to ports 10~12 in VLAN 1.

```
sysname# configure
sysname(config)# multicast-forward name AAA mac 01:00:5e:00:00:06 vlan 1
interface port-channel 10-12
```

63

Static Route Commands

Use these commands to tell the Switch how to forward IP traffic.

63.1 Command Summary

The following section lists the commands for this feature.

Table 151 ip route Command Summary

COMMAND	DESCRIPTION	M	P
`show ip route`	Displays the IP routing table.	E	13
`show ip route static`	Displays the static routes.	E	13
`ip route <ip-address> <mask> <next-hop-ip> [metric <metric>] [name <name>] [inactive]`	Creates a static route. If the `<ip-address> <mask>` already exists, the Switch deletes the existing route first. Optionally, also sets the metric, sets the name, and/or deactivates the static route. `<metric>`: 1-15 `<name>`: 1-32 English keyboard characters Note: If the `<next-hop-ip>` is not directly connected to the Switch, you must make the static route `inactive`.	C	13
`no ip route <ip-address> <mask>`	Removes a specified static route.	C	13
`no ip route <ip-address> <mask> inactive`	Enables a specified static route.	C	13

63.2 Command Examples

This example shows the current routing table.

```
sysname# show ip route
Dest            FF Len Device     Gateway         Metric stat Timer  Use
192.168.0.0     00 24  enet0      192.168.0.1       1    041b 0      0
172.1.1.0       00 24  swp00      172.1.1.204       1    041b 0      829
127.0.0.0       00 16  swp00      127.0.0.1         1    041b 0      0
0.0.0.0         00 0   swp00      172.1.1.254       2    801b 0      3708
```

The following table describes the labels in this screen.

Table 152 show ip route

LABEL	DESCRIPTION
Dest	This field displays the destination network number. Along with **Len**, this field defines the range of destination IP addresses to which this entry applies.
FF	This field is reserved.
Len	This field displays the destination subnet mask. Along with **Dest**, this field defines the range of destination IP addresses to which this entry applies.
Device	This field is reserved.
Gateway	This field displays the IP address to which the Switch forwards packets whose destination IP address is in the range defined by **Dest** and **Len**.
Metric	This field displays the cost associated with this entry.
stat	This field is reserved.
Timer	This field displays the number of remaining seconds this entry remains valid. It displays `0` if the entry is always valid.
Use	This field displays the number of times this entry has been used to forward packets.

In this routing table, you can create an active static route if the `<next-hop-ip>` is in 172.1.1.0/24 or 127.0.0.0/16. You cannot create an active static route to other IP addresses.

For example, you cannot create an active static route that routes traffic for 192.168.10.1/24 to 192.168.1.1.

```
sysname# configure
sysname(config)# ip route 192.168.10.1 255.255.255.0 192.168.1.1
  Error : The Action is failed. Please re-configure setting.
```

You can create this static route if it is inactive, however.

```
sysname# configure
sysname(config)# ip route 192.168.10.1 255.255.255.0 192.168.1.1 inactive
```

You can create an active static route that routes traffic for 192.168.10.1/24 to 172.1.1.254.

```
sysname# configure
sysname(config)# ip route 192.168.10.1 255.255.255.0 172.1.1.254
sysname(config)# exit
sysname# show ip route static
  Idx Active  Name       Dest. Addr.     Subnet Mask     Gateway Addr.
Metric
   01   Y     static     192.168.10.1    255.255.255.0   172.1.1.254      1
```

64

STP and RSTP Commands

Use these commands to configure Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP) as defined in the following standards.

- IEEE 802.1D Spanning Tree Protocol
- IEEE 802.1w Rapid Spanning Tree Protocol

64.1 Command Summary

The following section lists the commands for this feature.

Table 153 spanning-tree Command Summary

COMMAND	DESCRIPTION	M	P
`no spanning-tree`	Disables STP on the Switch.	C	13
`no spanning-tree <port-list>`	Disables STP on listed ports.	C	13
`show spanning-tree config`	Displays Spanning Tree Protocol (STP) settings.	E	13
`spanning-tree`	Enables STP on the Switch.	C	13
`spanning-tree <port-list>`	Enables STP on a specified ports.	C	13
`spanning-tree <port-list> path-cost <1-65535>`	Specifies the cost of transmitting a frame to a LAN through the port(s). It is assigned according to the speed of the bridge.	C	13
`spanning-tree <port-list> priority <0-255>`	Sets the priority for the specified ports. Priority decides which port should be disabled when more than one port forms a loop in a Switch. Ports with a higher priority numeric value are disabled first.	C	13
`spanning-tree hello-time <1-10> maximum-age <6-40> forward-delay <4-30>`	Sets Hello Time, Maximum Age and Forward Delay. `hello-time`: The time interval in seconds between BPDU (Bridge Protocol Data Units) configuration message generations by the root switch. `maximum-age`: The maximum time (in seconds) the Switch can wait without receiving a BPDU before attempting to reconfigure. `forward-delay`: The maximum time (in seconds) the Switch will wait before changing states.	C	13
`spanning-tree mode <RSTP|MSTP>`	Specifies the STP mode you want to implement on the Switch.	C	13

Table 153 spanning-tree Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`spanning-tree priority <0-61440>`	Sets the bridge priority of the Switch. The lower the numeric value you assign, the higher the priority for this bridge. `priority`: Must be a multiple of 4096.	C	13
`spanning-tree help`	Provides more information about the specified command.	C	13

64.2 Command Examples

This example shows the current STP settings.

```
sysname# show spanning-tree config
Bridge Info:
  (a)BridgeID:                  8000-001349aefb7a
  (b)TimeSinceTopoChange:       9
  (c)TopoChangeCount:           0
  (d)TopoChange:                0
  (e)DesignatedRoot:            8000-001349aefb7a
  (f)RootPathCost:              0
  (g)RootPort:                  0x0000
  (h)MaxAge:                    20      (seconds)
  (i)HelloTime:                 2       (seconds)
  (j)ForwardDelay:              15      (seconds)
  (k)BridgeMaxAge:              20      (seconds)
  (l)BridgeHelloTime:           2       (seconds)
  (m)BridgeForwardDelay:        15      (seconds)
  (n)TransmissionLimit:         3
  (o)ForceVersion:              2
```

The following table describes the labels in this screen.

Table 154 show spanning-tree config

LABEL	DESCRIPTION
BridgeID	This field displays the unique identifier for this bridge, consisting of bridge priority plus MAC address.
TimeSinceTopoChange	This field displays the time since the spanning tree was last reconfigured.
TopoChangeCount	This field displays the number of times the spanning tree has been reconfigured.
TopoChange	This field indicates whether or not the current topology is stable. `0`: The current topology is stable. `1`: The current topology is changing.
DesignatedRoot	This field displays the unique identifier for the root bridge, consisting of bridge priority plus MAC address.
RootPathCost	This field displays the path cost from the root port on this Switch to the root switch.
RootPort	This field displays the priority and number of the port on the Switch through which this Switch must communicate with the root of the Spanning Tree.

Table 154 show spanning-tree config (continued)

LABEL	DESCRIPTION
MaxAge	This field displays the maximum time (in seconds) the root switch can wait without receiving a configuration message before attempting to reconfigure.
HelloTime	This field displays the time interval (in seconds) at which the root switch transmits a configuration message.
ForwardDelay	This field displays the time (in seconds) the root switch will wait before changing states (that is, listening to learning to forwarding).
BridgeMaxAge	This field displays the maximum time (in seconds) the Switch can wait without receiving a configuration message before attempting to reconfigure.
BridgeHelloTime	This field displays the time interval (in seconds) at which the Switch transmits a configuration message.
BridgeForwardDelay	This field displays the time (in seconds) the Switch will wait before changing states (that is, listening to learning to forwarding).
TransmissionLimit	This field displays the maximum number of BPDUs that can be transmitted in the interval specified by **BridgeHelloTime**.
ForceVersion	This field indicates whether BPDUs are RSTP (a value less than 3) or MSTP (a value greater than or equal to 3).

This example configures STP in the following ways:

1. Enables STP on the Switch.
2. Sets the bridge priority of the Switch to 0.
3. Sets the Hello Time to 4, Maximum Age to 20 and Forward Delay to 15.
4. Enables STP on port 5 with a path cost of 150.
5. Sets the priority for port 5 to 20.

```
sysname(config)# spanning-tree
sysname(config)# spanning-tree priority 0
sysname(config)# spanning-tree hello-time 4 maximum-age 20 forward-delay
--> 15
sysname(config)# spanning-tree 5 path-cost 150
sysname(config)# spanning-tree 5 priority 20
```

65

Subnet-based VLAN Commands

Use these commands to configure subnet-based VLANs on the Switch.

65.1 Subnet-based VLAN Overview

Subnet-based VLANs allow you to group traffic based on the source IP subnet you specify. This allows you to assign priority to traffic from the same IP subnet.

See also Chapter 53 on page 193 for protocol-based VLAN commands and Chapter 76 on page 293 for VLAN commands.

65.2 Command Summary

The following section lists the commands for this feature.

Table 155 subnet-based-vlan Command Summary

COMMAND	DESCRIPTION	M	P
`show subnet-vlan`	Displays subnet based VLAN settings on the Switch.	E	13
`subnet-based-vlan`	Enables subnet based VLAN on the Switch.	C	13
`subnet-based-vlan dhcp-vlan-override`	Sets the Switch to force the DHCP clients to obtain their IP addresses through the DHCP VLAN.	C	13
`subnet-based-vlan ipv6 name <name> source-ip <ipv6-address> mask-bits <mask-bits> vlan <vlan-id> priority <0-7>`	Specifies the name, IPv6 address, subnet mask, VLAN ID of the subnet based VLAN you want to configure along with the priority you want to assign to the outgoing frames for this VLAN. *mask-bits*: prefix length 1 ~ 64	C	13
`subnet-based-vlan ipv6 name <name> source-ip <ipv6-address> mask-bits <mask-bits> vlan <vlan-id> priority <0-7> inactive`	Disables the specified IPv6 subnet-based VLAN.	C	13
`subnet-based-vlan name <name> source-ip <ip> mask-bits <mask-bits> vlan <vlan-id> priority <0-7>`	Specifies the name, IP address, subnet mask, VLAN ID of the subnet based VLAN you want to configure along with the priority you want to assign to the outgoing frames for this VLAN.	C	13
`subnet-based-vlan name <name> source-ip <ip> mask-bits <mask-bits> vlan <vlan-id> priority <0-7> inactive`	Disables the specified subnet-based VLAN.	C	13

Table 155 subnet-based-vlan Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no subnet-based-vlan`	Disables subnet-based VLAN on the Switch.	C	13
`no subnet-based-vlan ipv6 source-ip <ipv6-address> mask-bits <mask-bits>`	Removes the specified IPv6 subnet from the subnet-based VLAN configuration.	C	13
`no subnet-based-vlan source-ip <ip> mask-bits <mask-bits>`	Removes the specified subnet from the subnet-based VLAN configuration.	C	13
`no subnet-based-vlan dhcp-vlan-override`	Disables the DHCP VLAN override setting for subnet-based VLAN(s).	C	13

65.3 Command Examples

This example configures a subnet-based VLAN (**subnet1VLAN**) with priority **6** and a VID of **200** for traffic received from IP subnet **172.16.37.1/24**.

```
sysname# subnet-based-vlan name subnet1VLAN source-ip 172.16.37.1 mask-bits
--> 24 vlan 200 priority 6
sysname(config)# exit
sysname# show subnet-vlan

Global Active :Yes
       Name       Src IP  Mask-Bits  Vlan  Priority  Entry Active
-----------  -----------  ---------  ----  --------  ------------
subnet1VLAN  172.16.37.1         24   200         6             1
```

66

Syslog Commands

Use these commands to configure the device's system logging settings and to configure the external syslog servers.

66.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 156 syslog User-input Values

COMMAND	DESCRIPTION
type	Possible values: `system`, `interface`, `switch`, `authentication`, `ip`.

The following section lists the commands for this feature.

Table 157 syslog Command Summary

COMMAND	DESCRIPTION	M	P
`syslog`	Enables syslog logging.	C	13
`no syslog`	Disables syslog logging.	C	13

Table 158 syslog server Command Summary

COMMAND	DESCRIPTION	M	P
`syslog server <ip-address> level <level>`	Sets the IP address of the syslog server and the severity level. <level>: 0~7.	C	13
`no syslog server <ip-address>`	Deletes the specified syslog server.	C	13
`syslog server <ip-address> inactive`	Disables syslog logging to the specified syslog server.	C	13
`no syslog server <ip-address> inactive`	Enables syslog logging to the specified syslog server.	C	13

Table 159 syslog type Command Summary

COMMAND	DESCRIPTION	M	P
`syslog type <type>`	Enables syslog logging for the specified log type.	C	13
`syslog type <type> facility <0~7>`	Sets the file location for the specified log type.	C	13
`no syslog type <type>`	Disables syslog logging for the specified log type.	C	13

67

TACACS+ Commands

Use these commands to configure external TACACS+ (Terminal Access Controller Access-Control System Plus) servers.

67.1 Command Summary

The following section lists the commands for this feature.

Table 160 tacacs-server Command Summary

COMMAND	DESCRIPTION	M	P
`show tacacs-server`	Displays TACACS+ server settings.	E	13
`tacacs-server timeout <1~1000>`	Specifies the TACACS+ server timeout value.	C	13
`tacacs-server mode <index-priority|round-robin>`	Specifies the mode for TACACS+ server selection.	C	13
`tacacs-server host <index> <ip> [auth-port <socket-number>] [key <key-string>]`	Specifies the IP address of the specified TACACS+ server. Optionally, sets the port number and key of the TACACS+ server. *index*: 1 or 2. *key-string*: 1-32 alphanumeric characters	C	13
`no tacacs-server <index>`	Disables TACACS+ authentication on the specified server.	C	13

Table 161 tacacs-accounting Command Summary

COMMAND	DESCRIPTION	M	P
`show tacacs-accounting`	Displays TACACS+ accounting server settings.	E	3
`tacacs-accounting timeout <1-1000>`	Specifies the TACACS+ accounting server timeout value.	C	13
`tacacs-accounting host <index> <ip> [acct-port <socket-number>] [key <key-string>]`	Specifies the IP address of the specified TACACS+ accounting server. Optionally, sets the port number and key of the external TACACS+ accounting server. *index*: 1 or 2. *key-string*: 1-32 alphanumeric characters	C	13
`no tacacs-accounting <index>`	Disables TACACS+ accounting on the specified server.	C	13

68

TFTP Commands

Use these commands to back up and restore configuration and firmware via TFTP.

68.1 Command Summary

The following section lists the commands for this feature.

Table 162 tftp Command Summary

COMMAND	DESCRIPTION	M	P
`copy tftp flash <ip> <remote-file>`	Restores firmware via TFTP.	E	13
`copy tftp config <index> <ip> <remote-file>`	Restores configuration with the specified filename from the specified TFTP server. <index>: 1.	E	13
`copy running-config tftp <ip> <remote-file>`	Backs up running configuration to the specified TFTP server with the specified file name.	E	13

69

Trunk Commands

Use these commands to logically aggregate physical links to form one logical, higher-bandwidth link. The Switch adheres to the IEEE 802.3ad standard for static and dynamic (Link Aggregate Control Protocol, LACP) port trunking.

69.1 Command Summary

The following section lists the commands for this feature.

The available trunk (T1, T2, ...) may vary depending on the Switch model.

Table 163 trunk Command Summary

COMMAND	DESCRIPTION	M	P
`show trunk`	Displays link aggregation information.	E	13
`trunk <T1|T2>`	Activates a trunk group.	C	13
`no trunk <T1|T2>`	Disables the specified trunk group.	C	13
`trunk <T1|T2> interface <port-list>`	Adds a port(s) to the specified trunk group.	C	13
`no trunk <T1|T2> interface <port-list>`	Removes ports from the specified trunk group.	C	13
`trunk <T1|T2> lacp`	Enables LACP for a trunk group.	C	13
`no trunk <T1|T2> lacp`	Disables LACP in the specified trunk group.	C	13
`trunk interface <port-list> timeout <lacp-timeout>`	Defines LACP timeout period (in seconds) for the specified port(s). <*lacp-timeout*>: 1 or 30.	C	13

69.2 Command Examples

This example activates trunk 1, places ports 5-8 in the trunk, and enables dynamic link aggregation (LACP) in the trunk.

```
sysname(config)# trunk T1
sysname(config)# trunk T1 interface 5-8
sysname(config)# trunk T1 lacp
```

70

trTCM Commands

This chapter explains how to use commands to configure the Two Rate Three Color Marker (trTCM) feature on the Switch.

70.1 trTCM Overview

Two Rate Three Color Marker (trTCM, defined in RFC 2698) is a type of traffic policing that identifies packets by comparing them to two user-defined rates: the Committed Information Rate (CIR) and the Peak Information Rate (PIR). trTCM then tags the packets:

- red - if the packet exceeds the PIR
- yellow - if the packet is below the PIR, but exceeds the CIR
- green - if the packet is below the CIR

The colors reflect the packet's loss priority and the Switch changes the packet's DiffServ Code Point (DSCP) value based on the color.

70.2 Command Summary

The following section lists the commands for this feature.

Table 164 trtcm Command Summary

COMMAND	DESCRIPTION	M	P
`trtcm`	Enables trTCM on the Switch.	C	13
`trtcm mode <color-aware|color-blind>`	Sets the mode for trTCM on the Switch.	C	13
`no trtcm`	Disables trTCM on the Switch.	C	13
`interface port-channel <port-list>`	Enters subcommand mode for configuring the specified ports.	C	13
`trtcm`	Enables trTCM on the specified port(s).	C	13
`no trtcm`	Disables trTCM on the port(s).	C	13
`trtcm cir <rate>`	Sets the Commit Information Rate in kbps on the port(s).	C	13
`trtcm pir <rate>`	Sets the Peak Information Rate in kbps on the port(s).	C	13
`trtcm dscp green <0~63>`	Specifies the DSCP value to use for packets with low packet loss priority.	C	13

Table 164 trtcm Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`trtcm dscp yellow <0~63>`	Specifies the DSCP value to use for packets with medium packet loss priority.	C	13
`trtcm dscp red <0~63>`	Specifies the DSCP value to use for packets with high packet loss priority.	C	13

70.3 Command Examples

This example activates trTCM on the Switch with the following settings:

- Sets the Switch to inspect the DSCP value of the packets (color-aware mode).
- Enables trTCM on ports 1-5.
- Sets the Committed Information Rate (CIR) to 4000 Kbps.
- Sets the Peak Information Rate (PIR) to 4500 Kbps.
- Specifies DSCP value 7 for green packets, 22 for yellow packets and 44 for red packets.

```
sysname(config)# trtcm
sysname(config)# trtcm mode color-aware
sysname(config)# interface port-channel 1-5
sysname(config-interface)# trtcm
sysname(config-interface)# trtcm cir 4000
sysname(config-interface)# trtcm pir 4500
sysname(config-interface)# trtcm dscp green 7
sysname(config-interface)# trtcm dscp yellow 22
sysname(config-interface)# trtcm dscp red 44
sysname(config-interface)# exit
sysname(config)# exit
sysname# show running-config interface port-channel 1 trtcm
  Building configuration...

  Current configuration:

interface port-channel 1
  trtcm
  trtcm cir 4000
  trtcm pir 4500
  trtcm dscp green 7
  trtcm dscp yellow 22
  trtcm dscp red 44
exit
```

71

VDSL Alarm Profile Commands

Use these commands to configure VDSL alarm profiles that you can assign to ports.

71.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 165 vdsl-alarmprofile User-input Values

COMMAND	DESCRIPTION
threshold	0~900.

The following section lists the commands for this feature.

Table 166 vdsl-alarmprofile Command Summary

COMMAND	DESCRIPTION	M	P
show vdsl-alarmprofile [*profile-name*]	Displays a summary list of VDSL alarm profiles. It does not display the DEFVAL profile. Optionally, displays the settings of the specified VDSL alarm profile.	E	13
vdsl-port <*port-list*> alarm-profilename <*name*>	Associates the VDSL port(s) to use the specified VDSL alarm profile.	C	13
vdsl-alarmprofile <*profile-name*>	Enters config-vdsl-alarmprofile mode for the specified VDSL alarm profile. Creates the profile, if necessary. <*profile-name*>: 1-31 English keyboard characters	C	13
15minsESs <*threshold*>	Sets the number of Errored Seconds (ES) allowed in any 15-minute period. An alarm is triggered if this number is exceeded.	C	13
15minsLofs <*threshold*>	Sets the number of Lost of Framing (LoF) errors allowed in any 15-minute period. An alarm is triggered if this number is exceeded.	C	13
15minsLols <*threshold*>	Sets the number of Lost of Link (LoL) errors allowed in any 15-minute period. An alarm is triggered if this number is exceeded.	C	13
15minsLoss <*threshold*>	Sets the number of Lost of Signal (Los) errors allowed in any 15-minute period. An alarm is triggered if this number is exceeded.	C	13
15minsLprs <*threshold*>	Sets the number of Loss of PoweR (LPR) errors allowed in any 15-minute period. An alarm is triggered if this number is exceeded.	C	13
15minsSESs <*threshold*>	Sets the number of Severely Errored Seconds (SES) errors allowed in any 15-minute period. An alarm is triggered if this number is exceeded.	C	13

Table 166 vdsl-alarmprofile Command Summary (continued)

COMMAND	DESCRIPTION	M	P
15minsUASs <*threshold*>	Sets the number of UnAvailable Seconds (UAS) errors allowed in any 15-minute period. An alarm is triggered if this number is exceeded.	C	13
initFailure <on|off>	Sets whether the device is to send an initialization failure trap or not.	C	13
no vdsl-alarmprofile <*profile-name*>	Disables the specified VDSL alarm profile.	C	13

Table 167 vdsl-alarm-template Command Summary

COMMAND	DESCRIPTION	M	P
show vdsl-alarm-template	Displays all configured VDSL alarm templates, their line/channel alarm profile settings, and applied ports.	E	13
vdsl-alarm-template <*template-name*>	Enters config-vdsl-alarm-template mode for the specified VDSL alarm template. Creates the template, if a new name is entered. *template-name*: 1-32 characters	C	13
alarm-chan1-profile <*channel-alarm-profile-name*>	Specifies a channel alarm profile for this VDSL alarm template. You can configure channel alarm profiles using vdsl-chan-alarm-profile commands.	C	13
alarm-line-profile <*line-alarm-profile-name*>	Specifies a line alarm profile for this VDSL alarm template. You can configure line alarm profiles using vdsl-line-alarm-profile commands.	C	13
exit	Exits the VDSL alarm template setting mode.	C	13
no vdsl-alarm-template <*template-name*>	Deletes the specified VDSL alarm template.	C	13

Table 168 vdsl-line-alarm-profile Command Summary

COMMAND	DESCRIPTION	M	P
show vdsl-line-alarm-profile [*profile-name*]	Displays all configured VDSL line alarm profiles, their threashold settings, and applied ports. With specifying a profile, you can view the detailed alarm profile settings.	E	13
vdsl-line-alarm-profile <*profile-name*>	Enters config-vdsl-line-alarm-profile mode for the specified VDSL line alarm profile. Creates the profile, if a new name is entered. Configures the threasholds below in this mode. An alarm is triggered if a threashold is exceeded. *profile-name*: 1-32 English keyboard characters	E	13
exit	Exits the VDSL line alarm profile setting mode.	C	13
fullInits <0~900>	Enters the number of times a full initialization is allowed to fail within 15 minutes.	C	13
xtucEs <0~900>	Sets the number of Errored Seconds (ES) allowed on the Switch (xtuc) within15 minutes.	C	13
xtucFecs <0~900>	Sets the number of Forward Error Correction Seconds (FECS) allowed on the Switch (xtuc) within 15 minutes.	C	13
xtucLofs <0..900>	Sets the number of Loss of Framing Seconds (LoFS) allowed on the Switch (xtuc) within 15 minutes.	C	13

Table 168 vdsl-line-alarm-profile Command Summary (continued)

COMMAND	DESCRIPTION	M	P
xtucLoss <0~900>	Sets the number of Loss of Signal Seconds(LoSS) allowed on the Switch (xtuc) within 15 minutes.	C	13
xtucSes <0~900>	Sets the number of Severely Errored Seconds (SES) errors allowed on the Switch (xtuc) within 15 minutes.	C	13
xtucUas <0~900>	Sets the number of UnAvailable Seconds (UAS) errors allowed on the Switch (xtuc) within 15 minutes.	C	13
xturEs <0~900>	Sets the number of Errored Seconds (ES) allowed on CPE devices (xtur) within 15 minutes.	C	13
xturFecs <0~900>	Enter the number of Forward Error Correction Seconds (FECS) allowed on CPE devices (xtur) within 15 minutes.	C	13
xturLofs <0~900>	Sets the number of Lost of Framing (LoF) errors allowed on CPE devices (xtur) within 15 minutes.	C	13
xturLoss <0~900>	Sets the number of Lost of Signal (Los) errors allowed on CPE devices (xtur) within 15 minutes.	C	13
xturLprs <0~900>	Sets the number of Loss of PoweR (LPR) errors allowed on CPE devices (xtur) within 15 minutes.	C	13
xturSes <0~900>	Sets the number of Severely Errored Seconds (SES) errors allowed on CPE devices (xtur) within 15 minutes.	C	13
xturUas <0~900>	Sets the number of UnAvailable Seconds (UAS) errors allowed on CPE devices (xtur) within 15 minutes.	C	13
no vdsl-line-alarm-profile <*profile-name*>	Deletes the specified VDSL line alarm profile.	C	13

Table 169 vdsl-chan-alarm-profile Command Summary

COMMAND	DESCRIPTION	M	P
show vdsl-chan-alarm-profile [*profile-name*]	Displays all configured VDSL channel alarm profiles, threashold settings, and applied ports. With specifying a profile, you can view the detailed profile settings.	E	13
vdsl-chan-alarm-profile <*profile-name*>	Enters config-vdsl-chan-alarm-profile mode for the specified VDSL channel alarm profile. Creates the profile, if a new name is entered. Configures the threasholds below in this mode. An alarm is triggered if a threashold is exceeded. *profile-name*: 1-32 English keyboard characters	C	13
correctedThresXtuc <0~4294967295>	Sets the number of error blocks allowed to be corrected on the Switch (xtuc) within 15 minutes.	C	13
correctedThresXtur <0~4294967295>	Sets the number of error blocks that can be allowed to be corrected on CPE devices (xtur) within 15 minutes.	C	13
cvThresXtuc <0~4294967295>	Sets the number of Code Violation (incorrect cyclic redundancy check) allowed on the Switch (xtuc) within 15 minutes.	C	13
cvThresXtur <0~4294967295>	Sets the number of Code Violation (incorrect cyclic redundancy check) allowed on CPE devices (xtur) within 15 minutes.	C	13
exit	Exits the VDSL channel alarm profile setting mode.	C	13
no vdsl-chan-alarm-profile <*profile-name*>	Deletes the specified VDSL channel alarm profile.	C	13

71.2 Command Examples

This example shows the current list of VDSL alarm profiles.

```
sysname# show vdsl-alarmprofile

  Name                          LOSs   ESs    SESs   InitFailure    Applied Ps
  ================================================================================
  test                            15     10     5      On
```

This example shows the settings of the VDSL alarm profile “test”.

```
sysname# show vdsl-alarmprofile test

  Profile Name                        : test
  15Mins LOFs Threshold               : 10
  15Mins LOSs Threshold               : 15
  15Mins LPRs Threshold               : 15
  15Mins LOLs Threshold               : 15
  15Mins ESs Threshold                : 10
  15Mins SESs Threshold               : 5
  15Mins UASs Threshold               : 5
  Initialization Failure              : On
```

72

VDSL Counters Commands

Use these commands to look at VDSL packet statistics.

72.1 Command Summary

The following section lists the commands for this feature.

Table 170 vdsl-counters Command Summary

COMMAND	DESCRIPTION	M	P
`vdsl clrcnt <all|<port-number>>`	Clears all VDSL statistics for all ports or a specified port.	E	13
`show vdsl-counters <port-number> channel-counters 15mins-counters <1-96>`	Displays VDSL statistics for a specified port in the specified 15-minute interval (1 ~ 96). Intervals are numbered sequentially in reverse chronological order; for example, interval 1 is the most recent 15-minute interval, interval 96 is the 15-minute interval 24 hours ago.	E	13
`show vdsl-counters <port-number> channel-counters 1day-counters`	Displays VDSL statistics for a specified port in the past one day.	E	13
`show vdsl-counters <port-number> inm 15M-history <1-96>`	Displays INM (Impulse Noise Monitor) statistics for a specified port in the specified 15-minute interval (1~ 96). Intervals are numbered sequentially in reverse chronological order; for example, interval 1 is the most recent 15-minute interval, interval 96 is the 15-minute interval 24 hours ago.	E	13
`show vdsl-counters <port-number> inm 1day-history <1-7>`	Displays INM (Impulse Noise Monitor) statistics for a specified port in the specified 1-day interval (1~ 7). Intervals are numbered sequentially in reverse chronological order; for example, interval 1 is the most recent 1-day interval, interval 7 is the 1-day interval 7 days ago.	E	13
`show vdsl-counters <port-number> inm current`	Displays INM (Impulse Noise Monitor) statistics recorded since the link was last up and in the current 15-minute and 24-hour periods for a specified port.	E	13
`show vdsl-counters <port-number> channel-counters persistence`	Displays VDSL statistics for a specified port since the port's link last came up.	E	13
`show vdsl-counters <port-number> performance-data 15M-history <1-96>`	Displays VDSL performance statistics for a specified port in the specified 15-minute interval (1~ 96). Intervals are numbered sequentially in reverse chronological order; for example, interval 1 is the most recent 15-minute interval, interval 96 is the 15-minute interval 24 hours ago.	E	13
`show vdsl-counters <port-number> performance-data 15mins-counters <1~96>`	Displays VDSL performance statistics for a specified port in the specified 15-minute interval (1~ 96). Intervals are numbered sequentially in reverse chronological order; for example, interval 1 is the most recent 15-minute interval, interval 96 is the 15-minute interval 24 hours ago.	E	13

Table 170 vdsl-counters Command Summary (continued)

COMMAND	DESCRIPTION	M	P
show vdsl-counters <*port-number*> performance-data 1day-history <1-7>	Displays VDSL performance statistics for a specified port in the specified 1-day interval (1~ 7). Intervals are numbered sequentially in reverse chronological order; for example, interval 1 is the most recent 1-day interval, interval 7 is the 1-day interval 7 days ago.	E	13
show vdsl-counters <*port-number*> performance-data 1day-counters	Displays VDSL performance statistics for a specified port in the past one day.	E	13
show vdsl-counters <*port-number*> performance-data current	Displays VDSL performance statistics for a specified port currently, in this 15-minute or in this one day time segment.	E	13
show vdsl-counters <*port-number*> sub-carrier hlog	Displays the Hlog parameter for the VDSL line (connected to the specified port). Hlog is one parameter of the Channel Transfer Function in mathematics. The Hlog can be used to see a line's capability against interference and attenuation.	E	13
show vdsl-counters <*port-number*> sub-carrier qln	Displays the QLN (Quiet Line Noise) parameter for the VDSL line (connected to the specified port). This is to see the line's noise level. The Quiet Line Noise for a DMT tone is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk.	E	13
show vdsl-counters <*port-number*> sub-carrier snr	Displays the SNR (Signal to Noise Ratio) parameter for the VDSL line (connected to the specified port). This is to see the line's signal strength.	E	13
show vdsl-status band-status <*port-number*>	Displays the status of upstream bands 0, 1, 2, 3, 4 (U0, U1, U2, U3, U4) and downstream bands 1, 2, 3, 4 (D1, D2, D3, D4) for the VDSL line connected to the specified port.	E	13
show vdsl-status line-status <*port-number*>	Displays the status of the VDSL line connected to the specified port.	E	13
show vdsl-status medley-psd <*port-number*>	Displays the final PSD the Switch proposes to the connected CPE during line initialization for the VDSL line connected to the specified port.	E	13
show vdsl-status subcarrier bitAlloc <*port-number*> <1|2>	Displays the number of bits allocated to each tone for the VDSL line (connected to the specified port). The higher the bit allocated, the higher the data transmission rate. 1: upstream 2: downstream	E	13
show vdsl-status subcarrier gainAlloc <*port-number*> <1|2>	Displays the the gain allocated to each tone for the VDSL line (connected to the specified port). Normally, each tone gets a different gain value allocated to avoid interference. 1: upstream 2: downstream	E	13
show vdsl-status subcarrier hlog <*port-number*> <1|2>	Displays the Hlog parameter for the VDSL line (connected to the specified port). Hlog is one parameter of the Channel Transfer Function in mathematics. The Hlog can be used to see a line's capability against interference and attenuation. 1: upstream 2: downstream	E	13

Table 170 vdsl-counters Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`show vdsl-status subcarrier qln <port-number> <1|2>`	Displays the QLN (Quiet Line Noise) parameter for the VDSL line (connected to the specified port). This is to see the line's noise level. The Quiet Line Noise for a DMT tone is the rms (root mean square) level of the noise present on the line, when no ADSL signals are present. It is measured in dBm/Hz. The QLN can be used in analyzing crosstalk. 1: upstream 2: downstream	E	13
`show vdsl-status subcarrier snr <port-number> <1|2>`	Displays the SNR (Signal to Noise Ratio) parameter for the VDSL line (connected to the specified port). This is to see the line's signal strength. 1: upstream 2: downstream	E	13

72.2 Command Examples

This example looks at the VDSL channel counters for port 2 in the most recent 15-minute interval.

```
sysname# show vdsl-counters 2 channel-counters 15mins-counters 1
  VDSL performance 15Mins counters
  Port NO.      :2              Interval       :1
  DS FixedOctets:       0               US FixedOctets:        0
  DS BadBlocks:         0               US BadBlocks:          0
```

The following table describes the labels in this screen.

Table 171 show vdsl-counters <port-number> channel-counters 15mins-counters

LABEL	DESCRIPTION
Port NO.	This field displays the port number.
Interval	This field displays the interval number. Intervals are numbered sequentially in reverse chronological order; for example, interval 1 is the last 15-minute interval, interval 2 is the 15-minute interval before that one, and so on.
DS FixedOctets	This field displays the number of downstream corrected octets in this interval as reported by the VDSL modem.
US FixedOctets	This field displays the number of upstream corrected octets in this interval as reported by the Switch.
DS BadBlocks	This field displays the number of downstream corrupt blocks in this interval as reported by the VDSL modem.
US BadBlocks	This field displays the number of upstream corrupt blocks in this interval as reported by the Switch.

This example looks at the VDSL performance counters for port 2 since the port's link last came up.

```
sysname# show vdsl-counters 2 performance-data current
  VDSL performance counters
  Port NO.      :2
  Current initialization
  DS LOFs:              0               US LOFs:              0
  DS LOSs:              0               US LOSs:              0
  DS LPRs/LPR:          0 / 0           US LPRs/LPR:          0 / 0
  DS LOLs/LOL:          0 / 0           US LOLs/LOL:          0 / 0
  DS ESs:               0               US ESs:               0
  DS SESs:              0               US SESs:              0
  DS CodeViolation:     0               US CodeViolation:     0
  DS UASs:              0               US UASs:              0
  DS Inits:             0               US Inits:             0
  Current 15 min interval
  DS LOFs:              0               US LOFs:              0
  DS LOSs:              0               US LOSs:              0
  DS LPRs/LPR:          0 / 0           US LPRs/LPR:          0 / 0
  DS LOLs/LOL:          0 / 0           US LOLs/LOL:          0 / 0
  DS ESs:               0               US ESs:               0
  DS SESs:              0               US SESs:              0
  DS UASs:              0               US UASs:              0
  DS Inits:             0               US Inits:             0
  Current 1 day interval
  DS LOFs:              0               US LOFs:              0
  DS LOSs:              0               US LOSs:              0
  DS LPRs/LPR:          0 / 0           US LPRs/LPR:          0 / 0
  DS LOLs/LOL:          0 / 0           US LOLs/LOL:          0 / 0
  DS ESs:               0               US ESs:               0
  DS SESs:              0               US SESs:              0
  DS UASs:              0               US UASs:              0
  DS Inits:             0               US Inits:             1
```

The following table describes the labels in this screen.

Table 172 show vdsl-counters <*port-number*> performance-data persistence

LABEL	DESCRIPTION
Current initialization	This section displays current VDSL performance measured at CO side (DS) and CPE side (US).
Current 15 min interval	This section displays the VDSL performance measured at CO side (DS) and CPE side (US) in this 15-minute (900 seconds) time segment..
Current 1 day interval	This section displays the VDSL performance measured at CO side (DS) and CPE side (US) in this 1-day (86400 seconds) time segment.
Port NO.	This field displays the port number.
DS LOFs	This field displays the count of 1-second intervals containing one or more Loss of Framing (LOF) failures reported by the CPE device.
US LOFs	This field displays the count of 1-second intervals containing one or more Loss of Framing (LOF) failures reported by the Switch.
DS LOSs	This field displays the count of 1-second intervals containing one or more Loss of Signal (LOS) failures reported by the CPE device.

Table 172 show vdsl-counters <*port-number*> performance-data persistence (continued)

LABEL	DESCRIPTION
US LOSs	This field displays the count of 1-second intervals containing one or more Loss of Signal (LOS) failures reported by the Switch.
DS LPRs/LPR	This field displays the count of 1-second intervals containing more than one (the first number) and a single (the second number) Loss of PoweR (LPR) failure(s) reported by the CPE device.
US LPRs/LPR	This field displays the count of 1-second intervals containing more than one (the first number) and a single (the second number) Loss of PoweR (LPR) failure(s) reported by the Switch.
DS LOLs/LOL	This field displays the count of 1-second intervals containing more than one (the first number) and a single (the second number) Loss Of Link (LOL) failure(s) reported by the CPE device.
US LOLs/LOL	This field displays the count of 1-second intervals containing more than one (the first number) and a single (the second number) Loss Of Link (LOL) failure(s) reported by the Switch.
DS ESs	This field displays the count of 1-second intervals containing one or more Errored Seconds (ES) reported by the CPE device.
US ESs	This field displays the count of 1-second intervals containing one or more Errored Seconds (ES) reported by the Switch.
DS SESs	This field displays the count of 1-second intervals containing one or more Severely Errored Seconds (SES) reported by the CPE device.
US SESs	This field displays the count of 1-second intervals containing one or more Severely Errored Seconds (SES) reported by the Switch.
DS CodeViolation	This field displays the number of Code Violation (incorrect cyclic redundancy check) reported by the CPE device.
US CodeViolation	This field displays the number of Code Violation (incorrect cyclic redundancy check) reported by the Switch.
DS UASs	This field displays the count of 1-second intervals containing one or more Unavailable Seconds (UAS) reported by the CPE device.
US UASs	This field displays the count of 1-second intervals containing one or more Unavailable Seconds (UAS) reported by the Switch.
DS Inits	This field displays the count of 1-second intervals containing one or more initialization failures reported by the CPE device.
US Inits	This field displays the count of 1-second intervals containing one or more initialization failures reported by the Switch.

73

VDSL Loop Diagnostic Commands

Use these commands to do the Dual-End Loop Test (DELT) or Single-End Loop Test (SELT) and see the testing report then.

Use `vdsl <port-list> loop-diagnostic delt start` to perform a Dual-End Loop Test or `vdsl <port-list> loop-diagnostic selt start` to perform a Single-End Loop Test before using other commands to check the testing result.

73.1 Command Summary

The following section lists the commands for this feature.

Table 173 Command Summary: vdsl loop diagnostic

COMMAND	DESCRIPTION	M	P
`vdsl <port-list> loop-diagnostic delt start`	Starts to perform a DELT for a line. Note: Make sure the line is at “ShowTime” status to perform this test.	E	13
`vdsl <port-number> loop-diagnostic delt status`	Displays a DELT result for a VDSL line (connected to a specified port).	E	13
`vdsl <port-number> loop-diagnostic delt actatp`	Displays the actual aggregate transmission power for a VDSL line (connected to a specified port).	E	13
`vdsl <port-number> loop-diagnostic delt attndr`	Displays the attainable net data rate for a VDSL line (connected to a specified port).	E	13
`vdsl <port-number> loop-diagnostic delt hlin-ps`	Displays the Hlin-ps (Channel Transfer Fuction per sub-carrier group) for a VDSL line (connected to a specified port). You can use this to see the line’s capability against attenuation.	E	13

Table 173 Command Summary: vdsl loop diagnostic (continued)

COMMAND	DESCRIPTION	M	P
`vdsl <port-number> loop-diagnostic delt hlog-ps`	Displays the Hlog-ps (Channel Transfer Function per sub-carrier group) for a VDSL line (connected to a specified port). You can use this to see the line's capability against attenuation. Both Hlin and Hlog are parameters of Channel Transfer Function. However, Hlin is the linear, complex, representation of the loop response. Hlog(f) is the logarithmic representation of the loop magnitude response in dB.	E	13
`vdsl <port-number> loop-diagnostic delt latn-pb`	Displays the LATN-pb (Line ATteNuation per band) for a VDSL line (connected to a specified port)	E	13
`vdsl <port-number> loop-diagnostic delt qln-ps`	Displays the QLN-ps (Quiet Line Noise per sub-carrier group) for a VDSL line (connected to a specified port). You can use this to see the line's noise level.	E	13
`vdsl <port-number> loop-diagnostic delt satn-pb`	Displays the SATN-pb (Signal ATteNuation per band) for a VDSL line (connected to a specified port)	E	13
`vdsl <port-number> loop-diagnostic delt snr-ps`	Displays the SNR-ps (Signal-to-Noise-Ratio per sub-carrier per second) to see the line's signal strength level by calculating the ratio between the received signal power and the received noise margin for that sub-carrier.	E	13
`vdsl <port-number> loop-diagnostic delt snrm-pb`	Displays the SNRM-pb (Signal-to-Noise Ratio Margin per band) for a VDSL line (connected to a specified port)	E	13
`vdsl <port-number> loop-diagnostic delt clear`	Clears the last DELT result for a VDSL line (connected to a specified port)	E	13
`vdsl <port-number> loop-diagnostic delt abort`	Aborts the current DELT for a VDSL line (connected to a specified port)	E	13
`vdsl <port-list> loop-diagnostic selt calibration show`	Displays the SELT calibration result for the specified port(s).	E	13
`vdsl <port-list> loop-diagnostic selt calibration test`	Performs SELT calibration for the specified port(s). This allows you to reset the SELT parameters on the Switch to achieve high SELT accuracy.	E	13
`vdsl <port-list> loop-diagnostic selt start`	Starts to perform a SELT for a line.	E	13
`vdsl <port-list> loop-diagnostic selt report`	Displays the SELT testing result.	E	13

73.2 Command Examples

This example checks that the line connected to the port 1 is connected ("ShowTime" status) and then it starts a dual-end loop test.

```
sysname# vdsl 1 loop-diagnostic delt status

Port 1
Status:ShowTime
Last test:
Elapsed time: 00:00:00
sysname# vdsl 1 loop-diagnostic delt start
Perform loopdiagnostic for port 1
```

This example aborts the dual-end loop test.

```
sysname# vdsl 1 loop delt abort

Port 1 test aborted
```

This example checks whether the line completes a dual-end loop testing and back to "ShowTime" status. Then checks the actual aggregate transmit power, attainable net data rate, LATN-ps and SNR-pb from the test result.

```
sysname# vdsl 1 loop-diagnostic status

Port 1
Status:Showtime
Last test: 06:12:15  1970-01-02
Elapsed time: 00:02:45
sysname# vdsl 1 loop-diagnostic actatp

Port 1
Actual aggregate transmit power (NE/FE): 4294966784 /    88 dBm
sysname# vdsl 1 loop-diagnostic attndr

Port 1
Attainable Net Data Rate (NE/FE): 12920 / 74760 kbps
sysname# vdsl 1 loop-diagnostic satn-pb

Port 1
SATN per band (dB):
Band     U0     U1     U2     U3     D1     D2     D3
SATN    2.2    1.2  102.3  102.3    0.6    1.2  102.3
sysname# vdsl 1 loop-diagnostic snrm-pb

Port 1
SNR Margin per band (dB):
Band     U0     U1     U2     U3     D1     D2     D3
SNRM    6.0    6.0 6502.4 6502.4    6.0    6.0 6502.4
```

74

VDSL Profile Commands

Use these commands to configure VDSL profiles that you can assign to ports.

74.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 174 vdsl-profile User-input Values

COMMAND	DESCRIPTION
rate	dspayloadrate: 64 ~ 104960 or 64 ~ 100332 Kbps. uspayloadrate: 64 ~ 104960 or 64 ~ 45440 Kbps.

The following section lists the commands for this feature.

Table 175 vdsl-profile Command Summary

COMMAND	DESCRIPTION	M	P
`show vdsl-profile [profile-name]`	Displays a summary list of VDSL profiles if you don't specify a profile name. Otherwise, displays settings of a specified VDSL profile.	E	13
`vdsl-port <port-list> profilename <name>`	Associates the VDSL port(s) to use the specified VDSL profile.	C	13
`no vdsl-profile <profile-name>`	Deletes the specified VDSL profile.	C	13
`vdsl-profile <profile-name>`	Enters config-vdsl-profile mode for the specified VDSL profile. Creates the profile, if a new name is entered. *profile-name*: 1-31 English keyboard characters.	C	13
`applicablestandard <2:etsi>`	Specifies the VDSL standard used on the line.	C	13
`compatiblemode <1~4>`	Sets the starting band of the frequency range used by VDSL services. 1: none 2: 640kHz 3: 1100kHz 4: 2200kHz	C	13
`bitswap <ds|us> <1:on|2:off>`	Enables or disables the bitswap for downstream or upstream. Bitswap allows on-line bits and power (for example, margin) reallocated among the allowed sub-carriers without service interruption or errors.	C	13
`dpbo <1:enable|2:disable>`	Enables or disables the DPBO (Downstream Power Back Off) on this Switch.	C	13

Table 175 vdsl-profile Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`dpbo epsd level <break-point> <0~255>`	Sets the DPBOEPSD PSD levels. *break-point*: 01~32 0~255: Each number represents an increase of 0.5 dBm/Hz.	C	13
`dpbo epsd shape <1:CO|2:Flat|3:CAB_ANSI|4:CAB_ETSI|5:EXCH_ANSI|6:EXCH_ETSI|7:custom>`	Sets the DPBOEPSD PSD shape. Set "7" if you want to customize breakpoints and PSD level for the PSD mask. Otherwise, use a pre-defined PSD mask (from 1 to 6).	C	13
`dpbo epsd tone <break-point> <0~4096>`	Sets the DPBOEPSD frequency tones. DPBOEPSD (DPBO assumed Exchange PSD mask) defines the PSD mask that is assumed to be exchanged at CO (central office). *break-point*: 01~32 0~4096: Each number represents an increase of 4.3125 kHz.	C	13
`dpbo <escma|escmb|escmc> <0~640>`	Sets the DPBOESCMA, DPBOESCMB and DPBOESCMC. These three parameters define a cable model that is used to describe the frequency dependent loss of exchange-side cables. 0~640: Each number represents an increase of 2^{-8}.	C	13
`dpbo esel <0~511>`	Sets the DPBOESEL which is the electrical length of the cable between CO and Cabinet. 0~511: Each number represents an increase of 0.5 dB.	C	13
`dpbo fmax <32~6956>`	Sets the DPBOFMAX. DPBOFMAX defines the maximum frequency at which DPBO may be applied. 32~6956: Each number represents an increase of 4.3125 kHz.	C	13
`dpbo fmin <0~2048>`	Sets the DPBOFMIN. DPBOFMIN defines the minimum frequency from which the DPBO shall be applied. 0~2048: Each number represents an increase of 4.3125 kHz	C	13
`dpbo mus <0~255>`	Sets the DPBOMUS. DPBOMUS defines the assumed minimum usable receives PSD mask (in dBm/Hz) for exchange based services, used to modify parameter DPBOFMAX defined above. 0~255: Each number represents an increase of 0.5dB.	C	13
`dsinterdelay <0~4,8>`	Sets the downstream interleave delay (in milliseconds).	C	13
`usinterdelay <0~4,8>`	Sets the upstream interleave delay.	C	13
`dspayloadrate max <rate>`	Sets the maximum downstream data rate.	C	13
`dspayloadrate min <rate>`	Sets the minimum downstream data rate.	C	13
`hamband mask <0000000-1111111>`	Sets the Ham (Handheld Amateur Radio) bands mask to not transmit data in the pre-defined bands to avoid radio frequency interference (RFI). See Section 74.2 on page 284 for more information.	C	13
`hamband <notch1start|notch1stop> <0~30000>`	Sets start and stop frequency bands to not transmit data in the first band range to avoid radio frequency interference (RFI).	C	13
`hamband <notch2start|notch2stop> <0~30000>`	Sets start and stop frequency bands to not transmit data in the second band range to avoid radio frequency interference (RFI).	C	13
`interleavedelay ds <0~255>`	Sets the downstream interleave delay.	C	13
`interleavedelay us <0~255>`	Sets the upstream interleave delay.	C	13

Table 175 vdsl-profile Command Summary (continued)

COMMAND	DESCRIPTION	M	P
limitpsdmask <*psdmask-id*>	Sets the limit PSD mask. *psdmask-id*: The following lists the available PSD mask ID. a_nus0_d32 - ANNEX_A_NUS0_D-32 [BandPlan:RegionA] a_eu32_d32 - ANNEX_A_EU-32_D-32 [BandPlan:RegionA] a_eu36_d48 - ANNEX_A_EU-36_D-48 [BandPlan:RegionA] a_eu40_d48 - ANNEX_A_EU-40_D-48 [BandPlan:RegionA] a_eu44_d48 - ANNEX_A_EU-44_D-48 [BandPlan:RegionA] a_eu48_d48 - ANNEX_A_EU-48_D-48 [BandPlan:RegionA] a_eu52_d64 - ANNEX_A_EU-52_D-64 [BandPlan:RegionA] a_eu56_d64 - ANNEX_A_EU-56_D-64 [BandPlan:RegionA] a_eu60_d64 - ANNEX_A_EU-60_D-64 [BandPlan:RegionA] a_eu64_d64 - ANNEX_A_EU-64_D-64 [BandPlan:RegionA]	C	13
maxpower ds <*range*>	Specify the maximum aggregate power level for downstream transmission. *range*: 0~5 or 0~58	C	13
maxpower us <*range*>	Specify the maximum aggregate power level for upstream transmission. *range*: 0~5 or 0~58	C	13
minINP <ds|us> <5~160>	Sets the downstream or upstream minimum INP (impulse Noise Protection). 5-160: Each number represents an increase of 0.1 symbol.	C	13
optusage <1~2>	Sets the use of optional channel for the upstream or downstream traffic. 1: unused 2: upstream	C	13
payloadrate <maxds|minds|maxus|minus> <64~104960>	Sets the actual data rate (in kbps) including maximum/ minimum downstream data rate and maximum/minimum upstream data rate. Note: Maximum data rate must be larger than minimum data rate.	C	13
payloadrate <maxdsfast|maxdsslow> <64~104960>	Specifies the maximum downstream fast/slow channel data rate in bits/second.	C	13
payloadrate <maxusfast|maxusslow> <64~104960>	Specifies the maximum upstream fast/slow channel data rate in bits/second.	C	13
payloadrate <mindsfast|mindsslow> <64~104960>	Specifies the minimum downstream fast/slow channel data rate in bits/second.	C	13
payloadrate <minusfast|minusslow> <64~104960>	Specifies the minimum upstream fast/slow channel data rate in bits/second.	C	13
pbo uscontrol <1~3>	Sets the upstream PBO control. 1: Disable 2: Auto 3: Manual	C	13
pbo uslevel <0~120>	Sets the upstream PBO level.	C	13

Table 175 vdsl-profile Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`psdtemplate ds <1~2>`	Sets a PSD mask for the downstream traffic.	C	13
`psdtemplate us <1~2>`	Sets a PSD mask for the upstream traffic.	C	13
`phyR <1:enable|2:disable>`	Enables or disables phyR which enables VDSL physical layer re-transmit data when impulse noise occurs. Enable this to improve link performance.	C	13
`ratemode <ds|us> <1:manual|2:adaptAtInit>`	Sets the rate adaptive mode for downstream or upstream.	C	13
`rateratio ds <0~100>`	Specifies the downstream data rate allocated for the fast and slow channels. 0: slow channel 100: fast channel	C	13
`rateratio us <0~100>`	Specifies the upstream data rate allocated for the fast and slow channels. 0: slow channel 100: fast channel	C	13
`rate-adaption <fix|adaption>`	Sets the rate adaption mode.	C	13
`rfi <disable|annex_f|etsi|t1e1>`	Sets the RFI (Radio Frequency Interference) band.	C	13
`snr <dsmax|usmax> <0~310|disable>`	Sets the maximum SNR (signal-to-noise ratio) margin for downstream or upstream. Each unit represents 0.1 dB. When the actual SNR margin is going to reach this specified value, this mechanism forces connected CPE device(s) to lower its transmission power level and maintains the actual SNR margin equal to or less than this value. Set **disable** to turn this mechanism off.	C	13
`snr <dsmin|dstarget|usmin|ustarget> <0~310>`	Sets the minimum and target SNR (signal-to-noise ratio) margin for downstream or upstream. Each unit represents 0.1 dB.	C	13
`snr dsmax <0~127>`	Sets the maximum downstream SNR (Signal to Noise Ratio).	C	13
`snr dsmin <0~127>`	Sets the minimum downstream SNR (Signal to Noise Ratio).	C	13
`snr dstarget <0~127>`	Sets the target downstream SNR (Signal to Noise Ratio).	C	13
`snr usmax <0~127>`	Sets the maximum upstream SNR (Signal to Noise Ratio).	C	13
`snr usmin <0~127>`	Sets the minimum upstream SNR (Signal to Noise Ratio).	C	13
`snr ustarget <0~127>`	Sets the target upstream SNR (Signal to Noise Ratio).	C	13
`targetslowburst ds <0~1275>`	Sets the target burst rate for the downstream slow channel.	C	13
`targetslowburst us <0~1275>`	Sets the target burst rate for the upstream slow channel.	C	13
`upbo <1:Auto|2:Manual|3:Disable>`	Enables UPBO (Upstream Power Back Off) in auto or manual mode or disables UPBO. When a line is in UPBO auto mode, the connected CPE devices adjust their PSD levels when transmiting data based on the negotiation result with the Switch. When a line is in UPBO manual mode, the connected CPE devices adjust their PSD levels when transmitting data based on the UPBO's electrical distance you set using the `upbo upboKL <0~1270>` command below.	C	13

Table 175 vdsl-profile Command Summary (continued)

COMMAND	DESCRIPTION	M	P
upbo <band1a|band2a> <4000~8095>	Sets the UPBO band 1 or band 2 parameter A. Each unit represents 0.01 Hz.	C	13
upbo <band1b|band2b> <0~4095>	Sets the UPBO band 1 or band 2 parameter B. Each unit represents 0.01 Hz.	C	13
upbo upboKL <0~1270>	Sets UPBO electrical length (0~1270) in 0.1 dB. See Section 74.3 on page 284 for more information.	C	13
uspayloadrate max *<rate>*	Sets the maximum upstream payload rate.	C	13
uspayloadrate min *<rate>*	Sets the minimum upstream payload rate.	C	13
vdsl2frequencyplan *<index>*	Sets the VDSL2 frequency profile used by the Switch. *index*: 1~2 or 1~3 (depending on the Switch model) • 1: 30A Annex A • 2: 30A Annex C TTC • 3: 30A ADE30	C	13
vdsl2Profile enable *<vdsl2-profile-type>* <30a|17a|12a|12b|8a|8b|8c|8d>	Enables the specified VDSL2 profile(s) support in this VDSL profile. *vdsl2-profile-type*: The available VDSL2 profile types include 30a, 17a, 12a, 12b, 8a, 8b, 8c and 8d. You can specify multiple profile types by using comma (,) in between. Note: The available VDSL2 profiles support may vary on your Switch. See the product specification chapter in your Switch's User's Guide.	C	13
vdsl-port *<port-list>* psd-profilename *<profile-name>*	Associates a specified VDSL PSD profile with specified port(s). *profile-name*: 1-31 English keyboard characters.	C	13
vdsl-psd profile	Displays a summary list of VDSL PSD profiles.	C	13
vdsl-psd profile *<profile-name>*	Displays settings of the specified VDSL PSD profile.	C	13
no vdsl-psd profile *<name>*	Removes a VDSL PSD profile. You cannot delete a default profile (DEFVAL).	C	13
vdsl-psd profile *<profile-name>* physide <1|2> frequence <0~30000> level <125~1400>	Sets a VDSL PSD profile. 1: DownStream 2: UpStream	C	13
no vdsl-psd profile *<profile-name>* physide <1|2> frequence <0~3000>	Removes the specified breakpoint in a VDSL PSD profile.	C	13

Table 176 vdsl-line-template Command Summary

COMMAND	DESCRIPTION	M	P
show vdsl-line-template	Displays all configured VDSL line templates, their line and channel profiles, channel rate ratio, and applied ports.	E	13
vdsl-line-template *<profile-name>*	Enters config-vdsl-line-template mode for the specified VDSL line template. Creates the line template, if a new name is entered. One VDSL line template should contain one VDSL line profile and one VDSL channel profile. *profile-name*: 1-31 English keyboard characters.	C	13

Table 176 vdsl-line-template Command Summary

COMMAND	DESCRIPTION	M	P
chan1-profile <*channel-profile-name*>	Specifies the channel profile for the VDSL line template. See Table 177 on page 276 for VDSL channel profile commands.	C	13
exit	Exits from the VDSL line template setting mode.	C	13
inm-profile <*inm-profile-name*>	Specifies the INM profile for the VDSL line template. See Table 178 on page 277 for VDSL INM profile commands.	C	13
line-profile <*line-profile-name*>	Specifies the line profile for the VDSL line template. See Table 179 on page 279 for VDSL line profile commands.	C	13
no vdsl-line-template <*template-name*>	Deletes the specified VDSL line template.	C	13

Table 177 vdsl-chan-profile Command Summary

COMMAND	DESCRIPTION	M	P
show vdsl-chan-profile [*profile-name*]	Displays all configured VDSL channel profiles, their data rate setting, applied ports, minimum INP, and maximum delay settings. With specifying a profile, you can view the detailed profile settings.	E	13
vdsl-chan-profile <*profile-name*>	Enters config-vdsl-chan-profile mode for the specified VDSL channel profile. Creates the channel profile, if a new name is entered. *profile-name*: 1-32 English keyboard characters.	C	13
exit	Exits from the VDSL channel profile setting mode.	C	13
maxDelayUs <0~63>	Types the number of milliseconds of interleave delays used for upstream transmission.	C	13
maxDelayDs <0~63>	Types the number of milliseconds of interleave delays used for downstream transmission. It is recommended that you configure same latency delays for both upstream and downstream.	C	13
maxRateDs <64~100032>	Types the maximum downstream transmission rates for this profile.	C	13
maxRateUs <64~100032>	Types the maximum upstream transmission rates for this profile. Note: This maximum upstream transmission rate should be less than the maximum downstream transmission rate.	C	13
minInp8Ds <0..16>	Sets the level of impulse noise (burst) protection for a slow (or interleaved) downstream channel in the 30a VDSL2 profile.	C	13
minInp8Us <0..16>	Sets the level of impulse noise (burst) protection for a slow (or interleaved) upstream channel in the 30a VDSL2 profile.	C	13
minInpDs <0|0.5|1~16>	Specifies the level of impulse noise (burst) protection for a slow (or interleaved) downstream channel. This parameter is defined as the number of consecutive DMT symbols or fractions thereof. The number of symbols decides how long in one period errors can be completely corrected. A higher symbol value provides higher error correction capability, but it causes overhead and higher delay which may impact multimedia data receiving quality.	C	13
minInpUs <0|0.5|1~16>	Specifies the level of impulse noise (burst) protection for a slow (or interleaved) upstream channel.	C	13
minRateDs <64~100032>	Types the minimum downstream transmission rates for this profile.	C	13

Table 177 vdsl-chan-profile Command Summary

COMMAND	DESCRIPTION	M	P
`minRateUs <64~100032>`	Types minimum upstream transmission rates for this profile.	C	13
`phyRDs <disable|enable|auto>`	Types `Enable` to use the VDSL physical layer for data re-transmission when impulse noise occurs on downstream traffic. This helps to get better link condition. Types `Disable` to turn this feature off. Types `Auto` to have the Switch enable this feature when there is no impact to the data rate.	C	13
`phyRUs <disable|enable|auto>`	Types `Enable` to use the VDSL physical layer for data re-transmission when impulse noise occurs on upstream traffic. This helps to get better link condition. Types `Disable` to turn this feature off. Types `Auto` to have the Switch enable this feature when there is no impact to the data rate.	C	13
`no vdsl-chan-profile <profile-name>`	Deletes the specified VDSL channel profile.	C	13

Table 178 vdsl-inm-profile Command Summary

COMMAND	DESCRIPTION	M	P
`show vdsl-inm-profile [profile-name]`	Displays all configured VDSL INM profiles, their INM control parameters and applied ports. With specifying a profile, you can view the detailed profile settings. See Section 74.4 on page 285 for more information about INM.	E	13
`vdsl-inm-profile <profile-name>`	Enters config-vdsl-inm-profile mode for the specified VDSL INM profile. Creates the channel profile, if a new name is entered. *profile-name*: 1-32 English keyboard characters.	C	13
`exit`	Exits from the VDSL INM profile setting mode.	C	13
`fe-iat-offset <3..511>`	Specifies the far-end IAT offset from 3 to 511 DMT symbols. This is to determine in which bin (category) of the IAT histogram the IAT is reported. There are eight bins (0 to 7) in an IAT histogram. An IAT is logged in bin y (where y can be from 1 to 6) if the reported IAT value is in the range from (IAT Offset + (y -1) x ($2^{IATStep}$)) to ((IAT Offset - 1) + (y) x ($2^{IATStep}$)). If an impulse event occurs at an interval less than the specified IAT offset, the IAT will be logged in bin 0 of the IAT historgram. Any IAT greater than or equal to (IAT Offset + 6 x $2^{IATStep}$) will be recorded in bin 7.	C	13
`fe-iat-step <0..7>`	Specifies the far-end IAT step from 0 to 7. This is to determine in which bin (category) of the IAT histogram the IAT is reported.	C	13
`fe-inmcc <0..64>`	Specifies the far-end cluster continuation value (0 to 64 DMT symbols) used for INM cluster indication.	C	13

Table 178 vdsl-inm-profile Command Summary

COMMAND	DESCRIPTION	M	P
`fe-inpEqMode <0..3>`	Specifies the way of computating equivalent INP at the far-end in this profile. See ITU-T G.993.2 for more information. **0**: In this mode, the INMCC value is 0 and the cluster length (the number of data symbols from the first to the last severely degraded data symbols in a cluster) is used to generate the histogram. Each set of consecutive severely degraded data symbols is considered as a separate impulse noise event. **1**: In this mode, the specified INMCC value and cluster length are used to generate the histogram. This provides an upper bound on the level of the required INP. **2**: In this mode, the specified INMCC value and the number of the severely degraded data symbols in a cluster are used to generate the histogram. This provides a lower bound on the level of the required INP. **3**: In this mode, the specified INMCC value, cluster length, the number of the severely degraded data symbols in a cluster and the number of gaps in a cluster are used to generate the histogram. This provides the best estimate of the required INP level.	C	13
`ne-iat-offset <3..511>`	Specifies the near-end IAT offset from 3 to 511 DMT symbols. This is to determine in which bin (category) of the IAT histogram the IAT is reported. There are eight bins (0 to 7) in an IAT histogram. An IAT is logged in bin y (where y can be from 1 to 6) if the reported IAT value is in the range from (IAT Offset + (y -1) x ($2^{IATStep}$)) to ((IAT Offset - 1) + (y) x ($2^{IATStep}$)). If an impulse event occurs at an interval less than the specified IAT offset, the IAT will be logged in bin 0 of the IAT historgram. Any IAT greater than or equal to (IAT Offset + 6 x $2^{IATStep}$) will be recorded in bin 7.	C	13
`ne-iat-step <0..7>`	Specifies the near-end IAT step from 0 to 7. This is to determine in which bin (category) of the IAT histogram the IAT is reported.	C	13
`ne-inmcc <0..64>`	Specifies the near-end cluster continuation value (0 to 64 DMT symbols) used for INM cluster indication.	C	13
`ne-inpEqMode <0..3>`	Specifies the way of computating equivalent INP at the near-end in this profile. See ITU-T G.993.2 for more information. **0**: In this mode, the INMCC value is 0 and the cluster length (the number of data symbols from the first to the last severely degraded data symbols in a cluster) is used to generate the histogram. Each set of consecutive severely degraded data symbols is considered as a separate impulse noise event. **1**: In this mode, the specified INMCC value and cluster length are used to generate the histogram. This provides an upper bound on the level of the required INP. **2**: In this mode, the specified INMCC value and the number of the severely degraded data symbols in a cluster are used to generate the histogram. This provides a lower bound on the level of the required INP. **3**: In this mode, the specified INMCC value, cluster length, the number of the severely degraded data symbols in a cluster and the number of gaps in a cluster are used to generate the histogram. This provides the best estimate of the required INP level.	C	13
`no vdsl-inm-profile <`*`profile-name`*`>`	Deletes the specified VDSL INM profile.	C	13

Table 179 vdsl-line-profile Command Summary

COMMAND	DESCRIPTION	M	P
`show vdsl-line-profile [profile-name]`	Displays all configured VDSL line profiles, their VDSL2 profile setting, applied ports and SNR margins. With specifying a profile, you can view the detailed profile settings.	E	13
`vdsl-line-profile <profile-name>`	Enters config-vdsl-line-profile mode for the specified VDSL line profile. Creates the line profile, if a new name is entered. *profile-name*: 1-31 English keyboard characters.	C	13
`bitSwapDs <enable|disable>`	Enables or disables bit swap for downstream traffic.	C	13
`bitSwapUs <enable|disable>`	Enables or disables bit swap for upstream traffic.	C	13
`classMask <a998ORb997M1cORc998B>`	Specifies a class mask for the profile. A class mask is a combination of several PSD masks according to the PSD mask types. a998ORb997M1cORc998B: • When you set the transmission mode to g9932AnnexA, this option represents one option, 998. • When you set the transmission mode to g9932AnnexB , this option represents seven options, 997M1c~HpeM1. • When you set the transmission mode to g9932AnnexC , this option represents two options, 998B and 998co. You can configure the transmission mode using the `vdsl-line-profile <profile-name> xdsl2Mode <g9932AnnexA>` command. The options vary depending on your model.	C	13
`classMask <998or997-M1c|997-M1x|997-M2x|998-M1x|998-M2x|998ADE-M2x|HPE-M1>`	Specifies a class mask for the profile. A class mask is a combination of several PSD masks according to the PSD mask types. You can configure the transmission mode using the `vdsl-line-profile <profile-name> xdsl2Mode <g9932AnnexA|g9932AnnexB>` command. The options vary depending on your model.	C	13
`dpboEPsd <tone-index1> <psd-level> [<tone-index2> <psd-level>] ...`	Adjusts the PSD level on tones on VDSL switch(es) at street cabinets. VDSL signal may interfere with other services (such as ISDN, ADSL or ADSL2 provided by other devices) on the same bundle of lines due to downstream far-end crosstalk. DPBO (Downstream Power Back Off) can reduce performance degradation by changing the PSD level on tones on the VDSL switch(es) at street cabinet level. *tone-index*: Enter a number from 0 to 4096. A tone is a sub-channel of VDSL band. DMT divides VDSL bands into many 4.3125 kHz tones. *psd-level*: Enter from 0 (0 dBm/Hz) to 255 (-127.5 dBm/Hz) in steps of 0.5dBm/Hz.	C	13
`dpboESCMA <0~640>`	Sets the DPBOESCMA parameter which defines a cable model that is used to describe the frequency dependent loss of exchange-side cables. 0~640: Each number represents an increase of 2^{-8}.	C	13
`dpboESCMB <0~640>`	Sets the DPBOESCMB parameter which defines a cable model that is used to describe the frequency dependent loss of exchange-side cables. 0~640: Each number represents an increase of 2^{-8}.	C	13

Table 179 vdsl-line-profile Command Summary

COMMAND	DESCRIPTION	M	P
`dpboESCMC <0~640>`	Sets the DPBOESCMC parameter which defines a cable model that is used to describe the frequency dependent loss of exchange-side cables. `0~640`: Each number represents an increase of 2^{-8}.	C	13
`dpboEsel <0~511>`	Sets the DPBOESEL parameter which specifies the electrical length of the cable between CO and Cabinet. `0~511`: Each number represents an increase of 0.5 dB.	C	13
`dpboFmax <32~6956>`	Sets the DPBOFMAX parameter which defines the maxmum frequency at which the DPBO may be applied. `32~6956`: Each number represents an increase of 4.3125 kHz.	C	13
`dpboFmin <0~2048>`	Sets the DPBOFMIN parameter which defines the minimum frequency from which the DPBO shall be applied. `0~2048`: Each number represents an increase of 4.3125 kHz.	C	13
`dpboMus <0~255>`	Sets the DPBOMUS parameter which defines the assumed minimum usable signal deployed from the Switch. `0~255`: Each number represents an increase of 0.5dB.	C	13
`exit`	Exits from the VDSL line profile setting mode.	C	13
`limitMask <d32|d48|d64|d128|b7-1 .. b7-10|b8-1 .. b8-16>`	Sets the downstream limit mask you want the Switch to use. `d32`: ANNEX A downstream band 32 `d48`: ANNEX A downstream band 48 `d64`: ANNEX A downstream band 64 `d128`: ANNEX A downstream band 128 The options vary depending on your model.	C	13
`maxAggRxPwrUs <-255~255 |disable>`	Sets the maximum upstream aggregate receiving power level or disables it.	C	13
`maxNomAtpDs <0~255>`	Sets the maximum downstream aggregate transmiting power level.	C	13
`maxNomAtpUs <0~255>`	The maximum upstream aggregate transmiting power level.	C	13
`maxSnrmDs <0~310|disable>`	Sets the maximum SNR (Signal to Noise Ratio) margin allowed on the downstream channel. Alternatively, set this to `Disable` to turn this off.	C	13
`maxSnrmUs <0~310|disable>`	Sets the maximum SNR (Signal to Noise Ratio) margin allowed on the upstream channel. Alternatively, set this to `Disable` to turn this off.	C	13
`mibPsdMaskDs <tone-index1> <psd-level> [<tone-index2> <psd-level>] ...`	Adjusts the MIB PSD level on downstream tones. *`tone-index`*: Enter a number from 0 to 4096. A tone is a sub-channel of VDSL band. DMT divides VDSL bands into many 4.3125 kHz tones. *`psd-level`*: Enter from 0 (0 dBm/Hz) to 255 (-127.5 dBm/Hz) in steps of 0.5dBm/Hz.	C	13
`mibPsdMaskUs <tone-index1> <psd-level> [<tone-index2> <psd-level>] ...`	Adjusts the MIB PSD level on upstream tones.	C	13
`minSnrmDs <0~310>`	Sets the minimum downstream SNR (Signal to Noise Ratio) margin accepted on the channel.	C	13
`minSnrmUs <0~310>`	Sets the minimum upstream SNR (Signal to Noise Ratio) margin accepted on the channel.	C	13

Table 179 vdsl-line-profile Command Summary

COMMAND	DESCRIPTION	M	P
`msgMinDs <4~248>`	Sets the minimum transmission rate (4~248 kbps) reserved for a line's downstream overhead channel. The Switch uses the channel of a line to send VDSL transmission statistics to its CPE device(s).	C	13
`msgMinUs <4~248>`	Sets the minimum transmission rate (4~248 kbps) reserved for a line's upstream overhead channel. The CPE device(s) use the channel of a line to send VDSL transmission statistics to the Switch.	C	13
`pmMode <allowTransitionsToIdle|notAllowTransitionsToIdle>`	Specifies whether to allow the Switch and CPE devices autonomously enter an idle state for power management (**allowTransitionsToIdle**) or not (**notAllowTransitionsToIdle**).	C	13
`raDsNrmDs <0~310>`	Sets the number of decibels (dB) for the line's down-shift SNR margin threshold for downstream transmission. When the line's signal-to-noise margin goes below this number, the Switch attempts to use a lower downstream transmission rate.	C	13
`raDsNrmUs <0~310>`	Sets the number of decibels (dB) for the line's down-shift SNR margin threshold for upstream transmission. When the line's signal-to-noise margin goes below this number, the Switch attempts to use a lower upstream transmission rate.	C	13
`raDsTimeDs <0~16383>`	Sets the number of seconds the Switch has to wait before using a lower downstream transmission rate when the line's SNR margin is less the down-shift SNR margin threshold.	C	13
`raDsTimeUs <0~16383>`	Sets the number of seconds the Switch has to wait before using a lower upstream transmission rate when the line's SNR margin is less the down-shift SNR margin threshold.	C	13
`raModeDs <manual|raInit|dynamicRa>`	Sets the downstream rate adaptive setting. `Manual`: Set this to have the Switch fix the transmission rate as configured minimum net data rate and disable transmission rate adjustment. If the attainable speeds cannot match configured speeds, then the VDSL link may go down or link communications may be sporadic due to line errors and consequent retransmissions. `AdaptAtInit`: Set this to have the Switch keep the transmission rate negotiated when the line is initiailized. It ranges from the configured minimum to the maximum net data rate based on the initial line condition. `Dynamic`: Set this to have the Switch dynamically change the transmission rate negotiated during initialization as well as during SHOWTIME status.	C	13
`raModeUs <manual|raInit|dynamicRa>`	Sets the upstream rate adaptive setting. See more description in the previous field above.	C	13
`raUsNrmDs <0~310>`	Sets the number of decibels (dB) for the line's up-shift SNR margin threshold for downstream transmission. When the line's signal-to-noise margin goes above this number, the Switch attempts to use a higher downstream transmission rate.	C	13
`raUsNrmUs <0~310>`	Sets the number of decibels (dB) for the line's up-shift SNR margin threshold for upstream transmission. When the line's signal-to-noise margin goes above this number, the Switch attempts to use a higher upstream transmission rate.	C	13

Table 179 vdsl-line-profile Command Summary

COMMAND	DESCRIPTION	M	P
raUsTimeDs <0~16383>	Sets the number of seconds the Switch has to wait before using a higher downstream transmission rate when the line's SNR margin is over the up-shift SNR margin threshold.	C	13
raUsTimeUs <0~16383>	Sets the number of seconds the Switch has to wait before using a higher upstream transmission rate when the line's SNR margin is over the up-shift SNR margin threshold.	C	13
refVnDs <*tone-index1*> <*noise-level*> [<*tone-index2*> <*noise-level*>] ...	Adds virtual noise levels on downstream tones where actual noise may occur. If there is too much noise on a line, the allowed line speed may be reduced or the line may not initialized. Virtual noise is the noise allowed before adjustment occurs. Switch then uses lower data rate on tones which you added a noise level for the line initialization. Lower data rate increases a line's stability and avoid the line to be easily dropped when actual noise occurs. The Switch adds pre-configured virtual noise on specified set of breakpoints. used to avoid a VDSL line assigning an overly optimistic number of bits to a sub-carrier. When the actual noise increased, the actual SNR margin is enough to maintain the bit-loading, and not leads to line drop. That is, the virtual noise adding can increase the line's stability.	C	13
refVnUs <*tone-index1*> <*psd-level*> [<*tone-index2*> <*psd-level*>] ...	Adds virtual noise levels on upstream tones where actual noise may occur.	C	13
rfiBand <*start-tone-index1*> <*stop-tone-index1*> [<*start-tone-index2*> <*stop-tone-index2*>] ...	Specifies the starting and ending tones for each RFI band according to your location. RFI (Radio Frequency Interference) is induced noise on the lines by surrounding radio frequency electromagnetic radiation from sources such as AM and HAM radio stations. Since VDSL uses a much larger frequency range that overlaps with other radio frequency systems, signals from VDSL lines and other radio systems interfere with each other. To avoid performance degradation due to RFI, set the Switch to not transmit VDSL signals in the RFI band.	C	13
snrModeDs <virtualNoiseEnabled|virtualNoiseDisabled>	Enables or disables the downstream transmitter referred virtual noise.	C	13
snrModeUs <virtualNoiseEnabled|virtualNoiseDisabled>	Enables or disables the upstream transmitter referred virtual noise.	C	13
targetSnrmDs <0~310>	Sets the target downstream SNR (Signal to Noise Ratio) margin.	C	13
targetSnrmUs <0~310>	Sets the target upstream SNR (Signal to Noise Ratio) margin.	C	13
upboKL <0~1280>	Sets the electrical length of the cable between Switch and cabinet in a step of 0.1 dB.	C	13

Table 179 vdsl-line-profile Command Summary

COMMAND	DESCRIPTION	M	P
upboKLF <auto|override|disableUpbo>	UPBO (Upstream Power Back-Off) mitigates far-end crosstalk (FEXT) caused by upstream transmission on shorter loops to longer loops. Set this to Auto to enable UPBO and CPE devices' PSD adjustment based on the negotiation result with the Switch. Set this to Manual to enable UPBO and CPE device's PSD adjustment based on the electrical distance you configured for the UPBOKL setting. Set this to Override to force CPE devices to use the electrical length defined by the Switch (for the UPBOKL setting above) to compute their UPBO. Set this to Disable to turn UPBO off.	C	13
upboPsdA <*value-for-us1*> [*value-for-us2*] ...	Specifies parameter A value(s) for each upstream band. The parameter A defines the original band shape. *value-for-usx*: 4000~8095, in a step of 0.01 dBm/Hz.	C	13
upboPsdB <*value-for-us1*> [*value-for-us2*] ...	Specifies parameter **B** value(s) for each upstream band. The parameter B defines the power back-off degree. *value-for-usx*: 0~4095, in a step of 0.01 dBm/Hz.	C	13
us0disable <allow|disable>	Specifies whether you want the Switch to automatically activate the upstream band 0 (allow) or not (disable) when necessary. Set the to allow to have CPE and the Switch use the upstream band 0 for upstream traffic transmission in a long distance. If you set this to disable, the CPE device may not able to transmit data in a long distance.	C	13
us0Mask <eu32|eu36|eu40|eu44|eu48|eu52|eu56|eu60|eu64|eu128>	Specifies a PSD mask used for upstream band 0. See ITU-T G.993.2 Annex A for more information.	C	13
vdsl2Profile <*vdsl2-profile-type*>	Specifies the VDSL2 profile(s) used for this VDSL line profile. *vdsl2-profile-type*: The available VDSL2 profile types include 17a, 12a, 12b, 8a, 8b, 8c and 8d. You can specify multiple profile types by using a comma (,) in between.	C	13
xdsl2Mode <g9932AnnexA>	Sets the VDSL2 transmission mode. Set this with an appropriate transmission standard (according to your territory) you want to apply for this profile. At the time of writing, the Switch only supports G.993.2 Annex A mode for American area and countries which follow American VDSL2 standard.	C	13
xdsl2Mode <g9932AnnexA|g9932AnnexB>	Sets the VDSL2 transmission mode. Set this with an appropriate transmission standard (according to your territory) you want to apply for this profile. At the time of writing, the Switch only supports G.993.2 Annex A mode for American area and countries which follow American VDSL2 standard and G.993.2 Annex B mode for countries which follow the Europe VDSL2 standard.	C	13
no vdsl-line-profile <*profile-name*>	Deletes the specified VDSL line profile.	C	13

74.2 Hamband Mask Bits

You can type 7 digits for the Ham band mask settings in the `vdsl-profile <profile-name> hamband mask <0000000-1111111>` command. The following describes each digit meaning.

Table 180 Ham Band Mask Bits

BITS	BANDPLAN	START FREQUENCY	STOP FREQUENCY	DESCRIPTION
Bit0	CustomNotch1	notch1start	notch1stop	Enter the start and stop values for the frequency range you wish to block.
Bit1	CustomNotch2	notch2start	notch2stop	Enter the start and stop values for the frequency range you wish to block.
Bit2	AmateurBand160m	1800 kHz	2000 kHz	Enable this to block the frequency range 1800-2000Khz.
Bit3	AmateurBand80m	3500 kHz	4000 kHz	Enable this to block the frequency range 3500-4000Khz.
Bit4	AmateurBand40m	7000 kHz	7300 kHz	Enable this to block the frequency range 7000-7300Khz.
Bit5	AmateurBand30m	10100 kHz	10150 kHz	Enable this to block the frequency range 10100-10150Khz.
Bit6	AmateurBand20m	14000 kHz	14350 kHz	Enable this to block the frequency range 14000-14350Khz.

74.3 UPBO/DPBO Electrical Length

The distance between a cabinet and the central office is an important parameter in UPBO/DPBO settings. The electrical length is used instead of the real physical distance according to G.997.1 format. Depending on the cable type the line used and physical line length, you can calculate the electrical length (in dB). For example, the distance is 1 kilometer and you use 24 AWG cable type, the electrical length 20.5 dB is suggested to be used.

The following table displays the calculation from a real length to an electrical length.

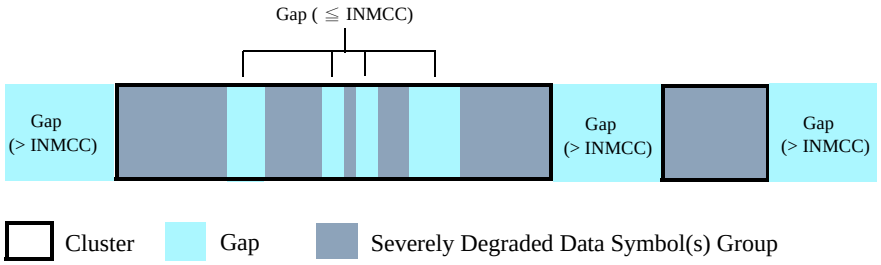
Table 181 Real Length to Electrical Length

CABLE TYPE	REAL LENGTH TO ELECTRICAL LENGTH	A	B	C
22 AWG	=16.2 x (cable length in kilometer)	0	0	0
24 AWG	=20.5 x (cable length in kilometer)	0	1	0
26 AWG	=25.8 x (cable length in kilometer)	0	1.0039065	-0.0039065

74.4 Impulse Noise Monitoring

In Impulse Noise Monitoring (INM), a cluster contains one or more groups of one single or consecutive severely degraded data symbols caused by impulse noise. Each cluster starts and ends with a severely degraded data symbol. Groups in a cluster are separated by a gap. A gap is a group of non-severely degraded data symbols between two severely degraded data symbols. Gaps between the groups in a cluster are smaller then or equal to the specified INM Cluster Continuation (INMCC). Gaps between the clusters are greater than the specified INMCC.

Figure 1 INM Cluster Example



An INM profile defines the control parameters used to generate the Equivalent INP (Eq INP or INP_Eq) and Inter-Arrival Time (IAT) histograms. The IAT represents the number of data symbols from the start of one cluster to the start of the next cluster.The Eq_INP histogram shows the level of INP required to prevent data errors and the IAT histogram shows time intervals between the impulse noise events.

74.5 Command Examples

This example shows the current list of VDSL profiles.

```
sysname# show vdsl-profile

  Name                            Payload Rate   SNR Margin     Applied Ports
  ================================================================================
                                   0M/0M          0dB/0dB
  test                             45M/9M         20dB/6dB       14-16
  Default                          45M/100M       6dB/6dB        1-13

sysname#
```

This example shows the settings of the VDSL profile “test”.

```
sysname# show vdsl-profile test

  Profile Name                        : test
  Downstream Payload Rate             : MAX: 9984 MIN: 4992
  Upstream Payload Rate               : MAX: 45440 MIN: 64
  Rate Adaptive                       : Fixed Mode
  Target Upstream SNR Margin          : 20dB
  Target Downstream SNR Margin        : 6dB
  MIN SNR Margin                      : 5dB
  RFI Band                            : ETSI
  Downstream Interleave Delay         : 2ms
  Upstream Interleave Delay           : 4ms
sysname#
```

This example configures ports 1-5 to use the VDSL profile “test”.

```
sysname(config)# vdsl-port 1-5 profilename test
```

This example displays all configured VDSL line and channel profiles.

```
sysname# show vdsl-line-profile

  Profile Name                    VDSL2 profile               SNR Margin
                                  Applied Ports

================================================================================
  DEFVAL                          17a                         6/6
                                  1-24
  L-profile1                      17a                         6/6

sysname# show vdsl-chan-profile

  ================================================================================
  Profile Name                    Data Rate         minINP        maxDelay
                                  Applied Ports
  ================================================================================
  DEFVAL                          100032/45056      2/2           8/8
                                  1-24
  --------------------------------------------------------------------------------
  C-profile1                      1000/800          2/2           8/8
```

This example displays how to create a VDSL template, specify one line and one channel profile to it, and display all VDSL templates again to view the result.

```
sysname# configure
sysname(config)# vdsl-line-template
sysname(config-vdsl-line-template)# line-profile L-profile1
sysname(config-vdsl-line-template)# chan1-profile C-profile1
sysname(config-vdsl-line-template)# exit
sysname(config)# exit
sysname# show vdsl-line-template

  Template Name                  Line Profile Name
                                 Channel#1 Profile Name          Rate Ratio
                                 Applied Ports
  ============================================================================
  DEFVAL                         DEFVAL
                                 DEFVAL                          100%/100%
                                 1-24
  ----------------------------------------------------------------------------
  L-template1                    L-profile1
                                 C-profile1                      100%/100%
```

75

VDSL Settings Commands

Use these commands to configure general VDSL settings.

75.1 Command Summary

The following section lists the commands for this feature.

Table 182 vdsl-common Command Summary

COMMAND	DESCRIPTION	M	P
`show vdsl-common`	Displays general VDSL settings.	E	13
`show vdsl-opstatus`	Shows whether the VDSL port is connected (**Showtime**), not connected (**Idle**), is searching for any CPE device (**Handshake**), is negotiating a connection with a CPE device (**Training**), is under loop diagnostic testing (**LD_TEST**), or has completed the loop diagnostic testing (**LD_DONE**).	E	13
`vdsl <port-list> remote-reset`	Resets the connection information and settings on the remote CPE device(s).	E	13
`vdsl <port-list> remote-test`	Sets the port(s) to test the connection to the remote CPE device(s).	E	13
`vdsl <port-list> reset`	Clears port statistics and connection information. This re-initializes the connection.	E	13
`vdsl <port-list> retrain`	Sets the port(s) to establish the connection again.	E	13
`vdsl-common bandplan <0>`	Sets the VDSL bandplan. 0: 998_5-Band	C	13
`vdsl-common latency <0|1>`	Sets the latency mode. 0: Interleave 1: Fast	C	13
`vdsl-common pbo <1|2>`	Sets the PBO option. 1: Disable 2: Auto	C	13
`vdsl-common psdmask <1|2|3|4>`	Sets the VDSL PSD mask. 1: ANSI M1 CAB 2: ANSI M2 CAB 3: ANSI M1 EX 4: ANSI M2 EX	C	13
`vdsl-port <port-list> <enable|disable>`	Enables or disables the specified VDSL port(s).	C	13
`vdsl-port <port-list> line-template <vdsl-template-name>`	Specifies a VDSL template for VDSL port(s). The template is used when the line is first initiated.	C	13

Table 182 vdsl-common Command Summary (continued)

COMMAND	DESCRIPTION	M	P
vdsl-port <*port-list*> line-fallback-template <*vdsl-template-name*>	Specifies a VDSL template for VDSL port(s). This template is used when the line failed to be initialized using the primary template configured using the command above.	C	13
vdsl-port <*port-list*> alarm-template <*vdsl-alarm-template-name*>	Specifies a VDSL alarm template for VDSL port(s). The Switch sends an SNMP trap (alarm) when a parameter value is over one of the pre-defined thresholds on the line.	C	13

75.2 Command Examples

This example sets the Switch to use fast VDSL latency mode, automatic PBO, and ANSI M2 CAB PSD mask on the VDSL lines.

```
sysname(config)# vdsl-common latency 1
sysname(config)# vdsl-common pbo 2
sysname(config)# vdsl-common psdmask 2
```

This example looks at general VDSL settings.

```
sysname# show vdsl-common

  Band Plan                          : 998 5Band

  UPBO                               : Disable

  Latency                            : Interleaved

  PSD Mask                           : ANSI M2 CAB
sysname#
```

This example displays how to

1. display all configured VDSL templates
2. display all configured VDSL alarm templates
3. apply a VDSL template, L-template1, for the primary VDSL template to ports 2~6 and 10
4. apply a VDSL template, DEFVAL, for the fall back VDSL template to ports 2~6 and 10
5. apply a VDSL alarm template, ALARM1, to ports 2~6 and 10

See Table 176 on page 275 and Table 167 on page 258 for `vdsl-line-template` and `vdsl-alarm-template` commands.

```
sysname# show vdsl-line-template

  Template Name                  Line Profile Name
                                 Channel#1 Profile Name          Rate Ratio
                                 Applied Ports
  ================================================================================
  DEFVAL                         DEFVAL
                                 DEFVAL                          100%/100%
                                 1-24
  --------------------------------------------------------------------------------
  L-template1                    L-profile1
                                 C-profile1                      100%/100%

sysname# show vdsl-alarm-template

  Template Name                  Alarm Line Profile Name
                                 Alarm Channel#1 Profile Name
                                 Applied Ports
  ================================================================================
  DEFVAL                         DEFVAL
                                 DEFVAL
                                 1-24
  --------------------------------------------------------------------------------
  ALARM1                         DEFVAL
                                 DEFVAL

sysname# configure
sysname(config)# vdsl-port 2-6,10 line-template L-template1
sysname(config)# vdsl-port 2-6,10 line-fallback-template DEFVAL
sysname(config)# vdsl-port 2-6,10 alarm-template ALARM1
sysname(config)# exit
sysname#
```

76

VLAN Commands

Use these commands to configure IEEE 802.1Q VLAN.

76.1 VLAN Overview

A VLAN (Virtual Local Area Network) allows a physical network to be partitioned into multiple logical networks. Devices on a logical network belong to one group. A device can belong to more than one group. With VLAN, a device cannot directly talk to or hear from devices that are not in the same group(s); the traffic must first go through a router.

VLAN is unidirectional; it only governs outgoing traffic.

76.2 VLAN Configuration Overview

1. Use the `vlan <vlan-id>` command to configure or create a VLAN on the Switch. The Switch automatically enters config-vlan mode. Use the `exit` command when you are finished configuring the VLAN.
2. Use the `interface port-channel <port-list>` command to set the VLAN settings on a port. The Switch automatically enters config-interface mode. Use the `pvid <vlan-id>` command to set the VLAN ID you created for the port-list in the PVID table. Use the `exit` command when you are finished configuring the ports.

```
sysname (config)# vlan 2000
sysname (config-vlan)# name up1
sysname (config-vlan)# fixed 5-8
sysname (config-vlan)# no untagged 5-8
sysname (config-vlan)# exit
sysname (config)# interface port-channel 5-8
sysname (config-interface)# pvid 2000
sysname (config-interface)# exit
```

See Chapter 28 on page 111 for `interface port-channel` commands.

76.3 Command Summary

The following section lists the commands for this feature.

Table 183 vlan Command Summary

COMMAND	DESCRIPTION	M	P
`show vlan`	Displays the status of all VLANs.	E	13
`show vlan <vlan-id>`	Displays the status of the specified VLAN.	E	13
`show vlan counters <vlan-id> <port-number> <Tx|Rx>`	Displays concurrent incoming or outgoing packet statistics of the specified port in the specified VLAN and refreshes in every 10 seconds until you press the [ESC] button.	E	13
`vlan-type <802.1q|port-based>`	Specifies the VLAN type.	C	13
`vlan <vlan-id>`	Enters config-vlan mode for the specified VLAN. Creates the VLAN, if necessary.	C	13
`fixed <port-list>`	Specifies the port(s) to be a permanent member of this VLAN group.	C	13
`no fixed <port-list>`	Sets fixed port(s) to normal port(s).	C	13
`forbidden <port-list>`	Specifies the port(s) you want to prohibit from joining this VLAN group.	C	13
`no forbidden <port-list>`	Sets forbidden port(s) to normal port(s).	C	13
`inactive`	Disables the specified VLAN.	C	13
`no inactive`	Enables the specified VLAN.	C	13
`name <name-str>`	Specifies a name for identification purposes. *<name-str>*: 1-64 English keyboard characters	C	13
`normal <port-list>`	Specifies the port(s) to dynamically join this VLAN group using GVRP	C	13
`untagged <port-list>`	Specifies the port(s) you don't want to tag all outgoing frames transmitted with this VLAN Group ID.	C	13
`no untagged <port-list>`	Specifies the port(s) you want to tag all outgoing frames transmitted with this VLAN Group ID.	C	13
`isolation`	Allows each port (in the specified VLAN) to communicate only with the CPU management port and the Gigabit uplink ports but not communicate with each other.	C	13
`no isolation`	Disables port isolation on the specified VLAN.	C	13
`protovlan`	Enables this protocol based VLAN.	C	13
`no protovlan`	Disables this protocol based VLAN.	C	13
`limitMAC <numbers>`	Limits the the number of (dynamic) MAC addresses learned in the same VLAN. *numbers*: 1~4000 or 1~16384. This may vary depending on the device model.	C	13
`help`	Provides more information about the specified command.	C	13
`ip address <ip-address> <mask>`	Sets the IP address and subnet mask of the Switch in the specified VLAN.	C	13
`ip address default-gateway <ip-address>`	Sets a default gateway IP address for this VLAN.	C	13
`ip address inband-default <ip-address> <mask>`	Sets and enables the in-band management IP address and subnet mask.	C	13

Table 183 vlan Command Summary (continued)

COMMAND	DESCRIPTION	M	P
ip address inband-default dhcp-bootp	Configures the Switch to get the in-band management IP address from a DHCP server.	C	13
ip address inband-default dhcp-bootp release	Releases the in-band management IP address provided by a DHCP server.	C	13
ip address inband-default dhcp-bootp renew	Updates the in-band management IP address provided by a DHCP server.	C	13
no ip address <*ip-address*> <*mask*>	Deletes the IP address and subnet mask from this VLAN.	C	13
no ip address default-gateway	Deletes the default gateway from this VLAN.	C	13
no ip address inband-default dhcp-bootp	Configures the Switch to use the static in-band management IP address. The Switch uses the default IP address of 192.168.1.1 if you do not configure a static IP address.	C	13
no vlan <*vlan-id*>	Deletes a VLAN.	C	13

76.4 Command Examples

This example configures ports 1 to 5 as fixed and untagged ports in VLAN 2000.

```
sysname (config)# vlan 2000
sysname (config-vlan)# fixed 1-5
sysname (config-vlan)# untagged 1-5
```

This example deletes entry 2 in the static VLAN table.

```
sysname (config)# no vlan 2
```

This example shows the VLAN table.

```
sysname# show vlan
  The Number of VLAN:    3
  Idx. VID   Status    Elap-Time    TagCtl
  ---- ----  -------- ------------ ------------------------
  1    1    Static     0:12:13     Untagged :1-2
                                    Tagged   :

  2  100    Static     0:00:17     Untagged :
                                    Tagged   :1-4

  3  200    Static     0:00:07     Untagged :1-2
                                    Tagged   :3-8
```

The following table describes the labels in this screen.

Table 184 show vlan

LABEL	DESCRIPTION
The Number of VLAN	This field displays the number of VLANs on the Switch.
Idx.	This field displays an entry number for each VLAN.
VID	This field displays the VLAN identification number.
Status	This field displays how this VLAN was added to the Switch. `Dynamic`: The VLAN was added via GVRP. `Static`: The VLAN was added as a permanent entry `Other`: The VLAN was added in another way, such as Multicast VLAN Registration (MVR).
Elap-Time	This field displays how long it has been since a dynamic VLAN was registered or a static VLAN was set up.
TagCtl	This field displays untagged and tagged ports. `Untagged`: These ports do not tag outgoing frames with the VLAN ID. `Tagged`: These ports tag outgoing frames with the VLAN ID.

77

VLAN Mapping Commands

Use these commands to configure VLAN mapping on the Switch. With VLAN mapping enabled, the Switch can map the VLAN ID and priority level of packets received from a private network to those used in the service provider's network. The Switch discards the tagged packets that do not match an entry in the VLAN mapping table.

You can not enable VLAN mapping and VLAN stacking at the same time.

77.1 Command Summary

The following section lists the commands for this feature.

Table 185 vlan mapping Command Summary

COMMAND	DESCRIPTION	M	P
`no vlan-mapping`	Disables VLAN mapping on the Switch.	C	13
`no vlan-mapping interface port-channel <port> vlan <1-4094>`	Removes the specified VLAN mapping rule.	C	13
`no vlan-mapping interface port-channel <port> vlan <1-4094> inactive`	Enables the specified VLAN mapping rule.	C	13
`vlan-mapping`	Enables VLAN mapping on the Switch.	C	13
`vlan-mapping name <name> interface port-channel <port> vlan <1-4094> translated-vlan <1-4094> priority <0-7> replace <0:Don't replace|1:Replace original prio>`	Creates a VLAN mapping rule. `replace`: Enter `0` to not change the priority in the customer VLAN tag, or enter `1` to replace the customer priority with what you configured for `priority`.	C	13
`vlan-mapping name <name> interface port-channel <port> vlan <1-4094> translated-vlan <1-4094> priority <0-7> replace <0:Don't replace|1:Replace original prio> inactive`	Disables the specified VLAN mapping rule. `replace`: Enter `0` to not change the priority in the customer VLAN tag, or enter `1` to replace the customer priority with what you configured for `priority`.	C	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`no vlan-mapping`	Disables VLAN mapping on the port(s).	C	13

Table 185 vlan mapping Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`no vlan-mapping miss-drop`	Forwards the incoming packets that do not match any VLAN mapping rules without replacing the VLAN tag.	C	13
`vlan-mapping`	Enables VLAN mapping on the port(s).	C	13
`vlan-mapping miss-drop`	Discards the incoming packets that do not match any VLAN mapping rules.	C	13

77.2 Command Examples

This example enables VLAN mapping on the Switch and creates a VLAN mapping rule (named **test**) to translate the VLAN ID from 123 to 234 and change the priority value to 3 in the packets received on port 4.

```
sysname# configure
sysname(config)# vlan-mapping
sysname(config)# vlan-mapping name test interface port-channel 4 vlan 123
translated-vlan 234 priority 3 replace 1
sysname(config)#
```

This example enables VLAN mapping on port 4.

```
sysname# configure
sysname(config)# interface port-channel 4
sysname(config-interface)# vlan-mapping
sysname(config-interface)# exit
sysname(config)#
```

78

VLAN Port Isolation Commands

Use these commands to specify which ports are allowed to communicate with which port(s) in the same VLAN.

78.1 Command Summary

The following section lists the commands for this feature.

Table 186 vlan1q port-isolation Command Summary

COMMAND	DESCRIPTION	M	P
`show vlan1q port-isolation`	Displays port isolation settings.	E	13
`vlan1q port-isolation`	Enables VLAN port isolation.	C	13
`vlan1q port-isolation <Normal|Enhanced>`	Enables VLAN port isolation on all VDSL ports and allows the VDSL ports to transmit traffic through only the uplink port (`Enhanced`) or through all the Gigabit ports (`Normal`). Note: In enhanced mode, STP should be enabled on the Switch to define the uplink port which may vary when the topology changes.	C	13
`no vlan1q port-isolation`	Disables VLAN port isolation.	C	13
`vlan1q port-isolation <port-list>`	Enters config-port mode to configure VLAN port isolation for the specified port(s).	C	13
`egress set <port-list>`	Enables egress port isolation on the specified port(s).	C	13
`no egress set <port-list>`	Disables egress port isolation on the specified port(s).	C	13

78.2 Command Examples

This example isolates port 1 from the other VDSL ports in a 16-port Switch. Port 1 is allowed to communicate with the Ethernet ports, and it can still be used to manage the Switch.

```
sysname# configure
sysname(config)# vlan1q port-isolation 1
sysname(config-port)# no egress set 2-16
sysname(config-port)# exit
sysname(config)# vlan1q port-isolation 2-16
sysname(config-port)# no egress set 1
sysname(config-port)# exit
sysname(config)# exit
sysname# show vlan1q port-isolation

Port Isolation Support
----------------------

                                Incoming

           1  2  3  4   5  6  7  8   9 10 11 12  13 14 15 16  17 18
        1  v                                                    v  v
        2     v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        3     v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        4     v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v

        5     v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        6     v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        7     v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        8     v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
Outgoing
        9     v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        10    v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        11    v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        12    v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v

        13    v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        14    v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        15    v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        16    v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v

        17 v  v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
        18 v  v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
       CPU v  v  v  v   v  v  v  v   v  v  v  v   v  v  v  v   v  v
```

79

VLAN-Profile Commands

Use these commands to configure the VLAN profiles in which you can specify the action the Switch takes on incoming unknown multicast frames and wthether to enable MAC address learning for this VLAN.

79.1 Command Summary

The following section lists the commands for this feature.

Table 187 vlan-profile Command Summary

COMMAND	DESCRIPTION	M	P
`no vlan-profile <name-str>`	Removes the specified VLAN profile.	C	13
`no vlan-profile all`	Removes all VLAN profiles on the Switch.	C	13
`show vlan-profile`	Displays all VLAN profiles settings on the Switch.	E	13
`show vlan-profile <name-str>`	Displays the specified VLAN profile settings.	E	13
`vlan <1-4094>`	Enters config-vlan mode for the specified VLAN.	C	13
`profile <name-str>`	Specifies the VLAN profile for this VLAN group.	C	13
`vlan-profile <name-str>`	Enters config-vlan-profile mode to create or edit the specified VLAN profile.	C	13
`Drop-unknown-multicast`	Discards unknown multicast frames for the VLAN to which this profile applies.	C	13
`help`	Provides more information about the specified command.	C	13
`mac-learning`	Eables MAC address learning in the VLAN to which this profile applies.	C	13
`no Drop-unknown-multicast`	Sends the unknown multicast frame(s) to all ports in the VLAN to which this profile applies.	C	13
`no mac-learning`	Disables MAC address learning in the VLAN to which this profile applies.	C	13

79.2 Command Examples

This example creates a VLAN profile (**test**) that enables MAC address learning and discards unknown multicast frames in a VLAN, and applies the profile to VLAN **11**. This example also displays the setting result and VLAN information on the Switch.

```
sysname# configure
sysname(config)# vlan-profile test
sysname(config-vlan-profile)# mac-learning
sysname(config-vlan-profile)# Drop-unknown-multicast
sysname(config-vlan-profile)# exit
sysname(config)# vlan 11
sysname(config-vlan)# profile test
sysname(config-vlan)# exit
sysname(config)# exit
sysname# write memory
sysname# show vlan-profile
  name  Mac Learning  unknown_multicast
------  ------------  -----------------
DEFVAL           Yes            Forward
  test           Yes               Drop
sysname# show vlan
  The Number of VLAN :     2
  Idx.  VID   Status     Elap-Time    TagCtl             Vlan-profile
  ----  ----  ---------  -----------  ----------------------------------

     1     1     Static     27:54:55  Untagged :  1-18     DEFVAL
                                      Tagged   :

     2    11     Static      0:01:40  Untagged :  1-18     test
                                      Tagged   :
sysname#
```

80

VLAN-Security Commands

Use these commands to allow only packets with dynamically learned MAC addresses and/or configured static MAC addresses to pass through a VLAN network on the Switch. For maximum VLAN security, enable VLAN security.

80.1 Command Summary

The following section lists the commands for this feature.

Table 188 vlan-security Command Summary

COMMAND	DESCRIPTION	M	P
`show vlan-security`	Displays all VLAN security settings.	E	13
`vlan-security`	Enables VLAN security on the Switch.	C	13
`no vlan-security`	Disables VLAN security on the Switch.	C	13
`vlan <1~4094>`	Enters config-vlan mode for the specified VLAN.	C	13
`limitMAC <1~16384>`	Specifies the maximum number(s) of the learned MAC addresses is allowed for this VLAN group.	C	13

80.2 Command Examples

This example enables port security on port 1 and limits the number of learned MAC addresses to 100. Then displays the setting result.

```
sysname# configure
sysname(config)# vlan-security
sysname(config)# vlan 1
sysname(config-vlan)# limitMAC 100
sysname(config-vlan)# exit
sysname(config)# exit
sysname# write memory
sysname# show vlan-security
  Vlan Security Active : YES
  Vlan   Number of Learned MAC Address   Limited Number of MAC Address
     1              3                            100
```

81

VLAN Stacking Commands

Use these commands to add an outer VLAN tag to the inner IEEE 802.1Q tagged frames that enter the network. A service provider can use this to distinguish multiple customers VLANs, even those with the same (customer-assigned) VLAN ID, within its network.

81.1 Command Summary

The following section lists the commands for this feature.

Table 189 vlan-stacking Command Summary

COMMAND	DESCRIPTION	M	P
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`vlan-stacking active-copyctagprio <1|0>`	Enables or disables setting the same priority in the service provider (outer) VLAN tage as the priority in the customer (inner) VLAN tag for frames received on the port(s). 1: Enable 0: Disable	C	13
`vlan-stacking active-innertag <1|0>`	Enables or disables adding a customer VLAN tag to untagged incoming traffic on the port whose VLAN stacking port role is set to access. 1: Enable 0: Disable	C	13
`vlan-stacking cpriority <0-7>`	Sets the priority level in the customer VLAN tag that the Switch adds to frames received on the port(s).	C	13
`vlan-stacking CPVID <1-4094>`	Sets the customer port VLAN ID (the inner VLAN tag) for frames received on the port(s).	C	13
`vlan-stacking innerQ-txuntag <1|0>`	Enables or disables removing the customer VLAN tag from outgoing traffic on the port whose VLAN stacking port role is set to access. 1: Enable 0: Disable	C	13
`vlan-stacking priority <0~7>`	Sets the priority of the specified port(s) in VLAN stacking.	C	13

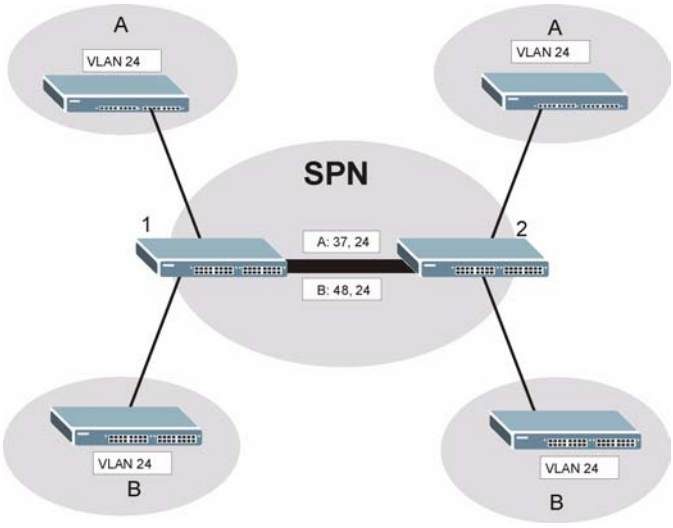
Table 189 vlan-stacking Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`vlan-stacking role <normal|access|tunnel>`	Sets the VLAN stacking port roles of the specified port(s). Note: You must enable or disable static VLAN tagging according to the port role. `normal`: The Switch ignores frames received or transmitted on this port with VLAN-stacking tags. The `SPVID` and `priority` are ignored. Static VLAN tagging must be disabled. `access`: The Switch adds the specified `SPVID` tag to all incoming frames received on this port. Use this for ingress ports at the edge of the service provider's network. Static VLAN tagging must be disabled. `tunnel` (Gigabit ports only): Use this for egress ports at the edge of the service provider's network. Static VLAN tagging must be enabled. In order to support VLAN stacking on a port, the port must be able to allow frames of 1526 Bytes (1522 Bytes + 4 Bytes for the second tag) to pass through it.	C	13
`vlan-stacking SPVID <1~4094>`	Sets the service provider VID of the specified port(s). You must create the service provider VLAN first.	C	13
`vlan-stacking tunnel-tpid <tpid>`	Sets a four-digit hexadecimal number from 0000 to FFFF that the Switch adds in the outer VLAN tag of the outgoing frames sent on the tunnel port(s).	C	13
`no vlan-stacking`	Disables VLAN stacking.	C	13
`no vlan-stacking selective-qinq interface port-channel <port> cvid <vlan-id>`	Removes the specified selective VLAN stacking rule.	C	13
`no vlan-stacking selective-qinq interface port-channel <port> cvid <vlan-id> inactive`	Enables the specified selective VLAN stacking rule.	C	13
`show vlan-stacking`	Displays VLAN stacking settings.	E	13
`vlan-stacking`	Enables VLAN stacking on the device.	C	13
`vlan-stacking <sptpid>`	Sets the service provider's TP (Tagged Protocol) ID. This is a standard Ethernet type code identifying the frame and indicating whether or not the frame carries IEEE 802.1Q tag information. 8100 and 9100 are typical values, but you can enter any four-digit hexadecimal number from 0000 to FFFF.	C	13
`vlan-stacking selective-qinq name <name> interface port-channel <port> cvid <cvid> spvid <spvid> priority <0-7> activeprio <0|1>`	Creates a selective VLAN stacking rule. *cvid*: 1 - 4094. This is the VLAN tag carried in the packets from the subscribers. *spvid*: 1 - 4094: This is the service provider's VLAN ID (the outer VLAN tag). `activeprio <0|1>`: Enter `0` to use the priority in the customer VLAN tag or enter `1` to use the priority you configured in this command.	C	13
`vlan-stacking selective-qinq name <name> interface port-channel <port> cvid <cvid> spvid <spvid> priority <0-7> activeprio <0|1> inactive`	Disables the specified selective VLAN stacking rule.	C	13

81.2 Command Examples

The service provider network (SPN) has two customers A and B. These customers both have VPN tunnels between their head offices and branch offices, and the traffic for both customers uses the same VLAN ID 24. The service provider distinguishes between these two customers by adding tag 37 to customer A's traffic and tag 48 to customer B's traffic when their traffic enters the SPN (and removing this tag when it leaves the SPN).

Figure 2 VLAN Stacking Example



This example shows how to set up switch 1. Customer A is connected to port 5, and customer B is connected to port 6. Ports 5 and 6 already belong to VLAN 24, and their PVID is 24.

```
sysname# configure
sysname(config)# vlan 24
sysname(config-vlan)# untagged 5-6
sysname(config-vlan)# exit
sysname(config)# vlan 37
sysname(config-vlan)# fixed 5
sysname(config-vlan)# untagged 5
sysname(config-vlan)# exit
sysname(config)# interface port-channel 5
sysname(config-interface)# vlan-stacking role access
sysname(config-interface)# vlan-stacking SPVID 37
sysname(config-interface)# exit
sysname(config)# vlan 48
sysname(config-vlan)# fixed 6
sysname(config-vlan)# untagged 6
sysname(config-vlan)# exit
sysname(config)# interface port-channel 6
sysname(config-interface)# vlan-stacking role access
sysname(config-interface)# vlan-stacking SPVID 48
sysname(config-interface)# exit
sysname(config)# exit
sysname# show vlan-stacking
Switch Vlan Stacking Configuration
Operation: active
STPID: 0x8100

Port             Role            SPVID           Priority
01               normal          1               0
02               normal          1               0
03               normal          1               0
04               normal          1               0
05               access          37              0
06               access          48              0
07               normal          1               0
08               normal          1               0
--------------------------------- SNIP ---------------------------------
```

This example shows how to set up switch 2, which is connected to switch 1 on Ethernet port 18. Customer A is connected to port 7, and customer B is connected to port 8. Ports 7 and 8 already belong to VLAN 24, and their PVID is 24.

```
sysname# configure
sysname(config)# vlan 37
sysname(config-vlan)# fixed 7,18
sysname(config-vlan)# no untagged 18
sysname(config-vlan)# exit
sysname(config)# vlan 48
sysname(config-vlan)# fixed 8,18
sysname(config-vlan)# no untagged 18
sysname(config-vlan)# exit
sysname(config)# interface port-channel 18
sysname(config-interface)# vlan-stacking role tunnel
sysname(config-interface)# exit
sysname(config)# exit
sysname# show vlan-stacking
Switch Vlan Stacking Configuration
Operation: inactive
STPID: 0x8100

Port             Role            SPVID           Priority
01               normal          1               0
02               normal          1               0
03               normal          1               0
04               normal          1               0
05               normal          1               0
06               normal          1               0
07               normal          1               0
08               normal          1               0
--------------------------------- SNIP ---------------------------------
18               tunnel          1               0
```

82

VLAN Translation

Use these commands to view or add a rule in the VTT (VLAN Translation Table).

82.1 Command Summary

The following table describes user-input values available in multiple commands for this feature.

Table 190 vlan-translation User-input Values

COMMAND	DESCRIPTION
port-num	This is the number of the VDSL port.
seq-num	This is the sequence number of the VTT entry for the same VDSL port.
cvid	Enter the CVID (Customer VLAN ID) from 1 to 4094. This is the VLAN tag carried in the packets and will be translated into a SVID.
svid	Enter the SVID (Subscriber VLAN ID) from 1 to 4094. This is the outer tag into which the ETI or CVID will be translated. This can be the ingress port VID, the static VLAN ID or the protocol-based VLAN ID.
spri	Enter the SPri (Subscriber Priority) from 0 to 7 into which the CPri will be translated.
cpri	Enter the CPri (Customer Priority) from 0 to 7. This is the VLAN tag carried in the packets and will be translated into a SPri. Leave this field blank for untagged incoming packets.
eti	Specify an ETI (Ethernet Type Identifier) by typing the protocol number in hexadecimal notation. For example the IP protocol in hexadecimal notation is 0800, and Novell IPX protocol is 8137.
cvids	Enter the inner VLAN tag from 1 to 4095 for all incoming packets. If you enter 4095, this tag will be removed before the Switch forwards the packets.

The following section lists the commands for this feature.

Table 191 vlan-translation Command Summary

COMMAND	DESCRIPTION	M	P
`no vlan-translation <port-num>`	Deletes VLAN translation rules for a port.	C	13
`no vlan-translation <port-num> <seq-num>`	Deletes a specified VLAN translation rule for a port.	C	13
`show vlan-translation`	Displays the VLAN translation table.	E	13
`show vlan-translation <port-num>`	Displays the the VLAN translation rules for a specified port.	E	13
`vlan-translation <port-num> single-tag <active> <cvid> <svid> <cvids>`	Creates a VTT entry for single-tagged packets received on the specified port.	C	13

Table 191 vlan-translation Command Summary (continued)

COMMAND	DESCRIPTION	M	P
`vlan-translation <port-num> single-tag <active> <cvid> <svid> <cvids> seq <seq-num>`	Creates or edits a specified VTT entry for single-tagged packets received on the specified port.	C	13
`vlan-translation <port-num> tls <active> <svid> <spri>`	Creates a VTT entry for VLAN stacking packets received on the specified port.	C	13
`vlan-translation <port-num> tls <active> <svid> <spri> seq <seq-num>`	Creates or edits a specified VTT entry for VLAN stacking packets received on the specified port.	C	13
`vlan-translation <port-num> untag-ethernet <active> <eti> <svid> <cvids> <spri> <cpri>`	Creates a VTT entry for protocol-based VLAN tagged packets received on the specified port.	C	13
`vlan-translation <port-num> untag-ethernet <active> <ETI> <sVid> <cVidS> <sPri> <cPri> seq <seq-num>`	Creates or edits a specified VTT entry for protocol-based VLAN tagged packets received on the specified port.	C	13
`vlan-translation <port-num> untag-normal <active> <sVid> <cVidS> <sPri> <cPri>`	Creates a VTT entry for untagged packets received on the specified port.	C	13
`vlan-translation <port-num> untag-normal <active> <sVid> <cVidS> <sPri> <cPri> seq <seq-num>`	Creates or edits a specified VTT entry for untagged packets received on the specified port.	C	13

82.2 Command Examples

This example displays the VLAN translation table on the Switch.

```
sysname# # show vlan-translation
  Port Seq  Active       Type          ETI   cVid  sPri  sVid  cPri  cVid_S
  ---- ---- ------ ---------------  ------  ----  ----  ----  ----  ------
    1    1   Yes      Untag-normal      -      -     0     1     0    4095
    2    1   Yes      Untag-normal      -      -     0     1     0    4095
    3    1   Yes      Untag-normal      -      -     0     1     0    4095
    3    2   Yes        Single-tag      -    123     -   123     -    4095
    3    3   Yes    Untag-ethernet  0x0800    -     0   123     0    4095
    4    1   Yes      Untag-normal      -      -     0     1     0    4095
    5    1   Yes      Untag-normal      -      -     0     1     0    4095
    6    1   Yes      Untag-normal      -      -     0     1     0    4095
    7    1   Yes      Untag-normal      -      -     0     1     0    4095
    8    1   Yes      Untag-normal      -      -     0     1     0    4095
    9    1   Yes      Untag-normal      -      -     0     1     0    4095
   10    1   Yes      Untag-normal      -      -     0     1     0    4095
   11    1   Yes      Untag-normal      -      -     0     1     0    4095
   12    1   Yes      Untag-normal      -      -     0     1     0    4095
   13    1   Yes      Untag-normal      -      -     0     1     0    4095
   14    1   Yes      Untag-normal      -      -     0     1     0    4095
   15    1   Yes      Untag-normal      -      -     0     1     0    4095
   16    1   Yes      Untag-normal      -      -     0     1     0    4095
sysname#
```

This example creates a VTT entry for incoming untagged packets to allow the Switch to forward them with double tags.

```
sysname(config)# vlan-translation 5 untag-normal 1 123 1 0 0
sysname(config)# exit
sysname# show vlan-translation 5
  Port Seq  Active       Type          ETI   cVid  sPri  sVid  cPri  cVid_S
  ---- ---- ------ ---------------  ------  ----  ----  ----  ----  ------
    5    1   Yes      Untag-normal      -      -     0      1    0    4095
    5    2   Yes      Untag-normal      -      -     0    123    0       1
sysname#
```

83

VLAN Trunking Commands

Use these commands to decide what the Switch should do with frames that belong to unknown VLAN groups.

83.1 Command Summary

The following section lists the commands for this feature.

Table 192 vlan-trunking Command Summary

COMMAND	DESCRIPTION	M	P
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`vlan-trunking`	Enables VLAN trunking on ports connected to other switches or routers (but not ports directly connected to end users) to allow frames belonging to unknown VLAN groups to pass through the Switch.	C	13
`no vlan-trunking`	Disables VLAN trunking on the port(s).	C	13

84

Additional Commands

Use these commands to configure or perform additional features on the Switch. There is more information for some commands in the Web Configurator section.

84.1 Command Summary

The following section lists the commands for this feature.

Table 193 Command Summary: Changing Modes or Privileges

COMMAND	DESCRIPTION	M	P
`enable`	Changes the session's privilege level to 14 and puts the session in enable mode (if necessary). The user has to provide the enable password. See Section 2.1.3.1 on page 20.	E	0
`enable <0-14>`	Raises the session's privilege level to the specified level and puts the session in enable mode if the specified level is 13 or 14. The user has to provide the password for the specified privilege level. See Section 2.1.3.2 on page 20.	E	0
`disable`	Changes the session's priority level to 0 and changes the mode to user mode. See Section 2.1.3.3 on page 21.	E	13
`rmt-vtur port-channel <port-list>`	Enters remote CPE configuration mode.	E	13
`configure`	Changes the mode to config mode.	E	13
`interface port-channel <port-list>`	Enters config-interface mode for the specified port(s).	C	13
`mode zynos`	Changes the mode to ZyNOS mode. ZyNOS mode commands are reserved.	C	13
`mvr <vlan-id>`	Enters config-mvr mode for the specified MVR (multicast VLAN registration). Creates the MVR, if necessary.	C	13
`vdsl-alarmprofile <profile-name>`	Enters config-vdsl-alarmprofile mode for the specified VDSL alarm profile. Creates the profile, if necessary.	C	13
`vdsl-profile <profile-name>`	Enters config-vdsl-profile mode for the specified VDSL profile. Creates the profile, if necessary.	C	13
`vlan <vlan-id>`	Enters config-vlan mode for the specified VLAN. Creates the VLAN, if necessary.	C	13
`vlan1q port-isolation <port-list>`	Enters config-port mode to configure VLAN port isolation for the specified port(s).	C	13
`exit`	Returns to the previous mode.	C	13
`logout`	Logs out of the CLI.	E	0

Table 194 Command Summary: Additional Enable Mode

COMMAND	DESCRIPTION	M	P
`baudrate <1:38400|2:19200|3:9600|4:57600|5:115200>`	Changes the console port baud rate (in bps).	E	0
`boot config`	Restarts the Switch (cold reboot) with the specified configuration file.	E	13
`boot image <1|2>`	Restarts the system with the specified firmware image (1: ras-0, 2: ras-1).	E	13
`cable-diagnostics <port-list>`	Perform a physical wire-pair test of the Ethernet connections on the specified port(s). **Ok**: The physical connection between the wire-pair is okay. **Open**: There is no physical connection between the wire-pair.	E	13
`ping <ip|host-name> [in-band|out-of-band|vlan <vlan-id>] [size <0-1472>] [-t]`	Sends Ping packets to the specified Ethernet device. *vlan-id*: Specifies the VLAN ID to which the Ethernet device belongs. `size <0-1472>`: Specifies the size of the Ping packet. `-t`: Sends Ping packets to the Ethernet device indefinitely. Press `[CTRL]+C` to terminate the Ping process.	E	0
`reload config [1|2]`	Restarts the system (warm reboot) with the specified configuration file. 1: config-1 2: config-2	E	13
`show boot-image`	Displays the firmware image file the Switch currently uses.	E	13
`show alarm-status`	Displays alarm status.	E	0
`show hardware-monitor <C|F>`	This command is not available in all models. Displays current hardware monitor information with the specified temperature unit (Celsius `C` or Fahrenheit `F`).	E	0
`show logging`	Displays system logs.	E	13
`show multicast`	Displays multicast status, including the port number, VLAN ID and multicast group members on the Switch.	E	13
`show multicast [vlan]`	Displays multicast status, including the port number, VLAN ID and multicast group members on the Switch. Optionally, displays the type of each multicast VLAN.	E	13
`show multicast counter`	Displays multicast traffic statistics per port.	E	13
`show multicast join-port`	Displays multicast group member information.	E	13
`show interfaces transceiver <port-list>`	Displays real-time SFP (Small Form Facter Pluggable) transceiver information and operating parameters on specified SFP port(s). The parameters include, for example, module temperature, module voltage, transmitting and receiving power.	E	3
`show system-information`	Displays general system information.	E	0
`show version [flash]`	Display the version of the currently running firmware on the Switch. Optionally, display the versions of the currently installed firmware images on the flash memory.	E	0
`test interface port-channel <port-list> <internal|external>`	Performs an internal or external loopback test on the specified ports. The test returns `Passed!` or `Failed!`.	E	13

Table 194 Command Summary: Additional Enable Mode (continued)

COMMAND	DESCRIPTION	M	P
`traceroute <ip|host-name> [in-band|out-of-band|vlan <vlan-id>] [ttl <1-255>] [wait <1-60>] [queries <1-10>]`	Determines the path a packet takes to the specified Ethernet device. `vlan <vlan-id>`: Specifies the VLAN ID to which the Ethernet device belongs. `ttl <1-255>`: Specifies the Time To Live (TTL) period. `wait <1-60>`: Specifies the time period to wait. `queries <1-10>`: Specifies how many times the Switch performs the traceroute function.	E	0
`traceroute help`	Provides more information about the specified command.	E	0
`write memory [<index>]`	Saves current configuration in volatile memory to the configuration file the Switch is currently using or the specified configuration file.	E	13

Table 195 Command Summary: Additional Configure Mode

COMMAND	DESCRIPTION	M	P
`hardware-alarm-setting cpu-utilization <percentage>`	Sets CPU utilization threshold for hardware alarm. For example, set 80 to have the Switch send a hardware alarm when the CPU usage over 80%. *percentage*:0~99 or 0~100. This range may vary depending on the Switch model.	C	13
`default-management <in-band|out-of-band>`	Sets which traffic flow (in-band or out-of-band) the Switch sends packets originating from itself (such as SNMP traps) or packets with unknown source.	C	13
`no hardware-alarm-setting cpu-utilization`	Removes CPU utilization threshold for hardware alarm.	C	13
`hardware-alarm-setting memory-usage <percentage>`	Sets memory usage threshold for hardware alarm. *percentage*:0~99 or 0~100. This range may vary depending on the Switch model.	C	13
`no hardware-alarm-setting memory-usage`	Removes memory usage threshold for hardware alarm.	C	13
`hardware-alarm-setting packet-buffer <percentage>`	Sets packet buffer threshold for hardware alarm. *percentage*:0~99 or 0~100. This range may vary depending on the Switch model.	C	13
`no hardware-alarm-setting packet-buffer`	Removes packet buffer threshold for hardware alarm.	C	13
`show cpu-utilization`	Displays CPU usage on the Switch.		
`show packet-buffer`	Displays memory usage on the Switch.		
`show memory-usage`	Displays packet buffer on the Switch.		
`hostname <hostname>`	Sets the Switch's name for identification purpose. *hostname*: 1-64 printable characters; spaces are allowed.	C	13
`bcp-transparency`	Enables Bridge Control Protocol transparency.	C	13
`no bcp-transparency`	Disables Bridge Control Protocol transparency.	C	13
`queue level <0~7> priority <0~7>`	Sets the priority level-to-physical queue mapping.	C	13

Table 195 Command Summary: Additional Configure Mode (continued)

COMMAND	DESCRIPTION	M	P
`queue priority <0-7> level <0-7>`	Sets the IEEE 802.1p priority level-to-physical queue mapping. `priority <0-7>`: IEEE 802.1p defines up to eight separate traffic types by inserting a tag into a MAC-layer frame that contains bits to define class of service. Frames without an explicit priority tag are given the default priority of the ingress port. `level <0-7>`: The Switch has up to 8 physical queues that you can map to the 8 priority levels. On the Switch, traffic assigned to higher index queues gets through faster while traffic in lower index queues is dropped if the network is congested.		
`fe-spq <Q0~Q7>`	Enables Strict Priority Queuing and specifies a queue on the fast Ethernet (10/100Mbps) ports.	C	13
`no fe-spq`	Disables Strict Priority Queuing on the fast Ethernet ports.	C	13
`sp_wrr`	Sets the Switch to use both Strict Priority (SP) and Weighted Round Robin (WRR) methods to service queues. When you configure queues with weight 0, they use the SP method. Otherwise, queues use the WRR method. Weighted Round Robin services queues on a rotating basis based on their queue weight (the number you configure in the interface weight command, see Table 69 on page 111). Queues with larger weights get more service than queues with smaller weights.	C	13
`spq`	Sets the Switch to use Strict Priority (SP) queuing method. SPQ services queues based on priority only. When the highest priority queue empties, traffic on the next highest-priority queue begins. Q7 has the highest priority and Q0 the lowest.	C	13
`wfq`	Sets the Switch to use Weighted Fair Scheduling (WFS) queuing method. WFS is used to guarantee each queue's minimum bandwidth based on their bandwidth portion (weight) (the number you configure in the interface weight command, see Table 69 on page 111). Queues with larger weights get more guaranteed bandwidth than queues with smaller weights.	C	13
`wfq fe-spq <Q0~Q7>`	Sets the Switch to use WFQ to service all queues for the Ethernet port.	C	13
`no wfq fe-spq`	Disables Strict Priority Queuing on the fast Ethernet (10/100Mbps) ports.	C	13
`wrr`	Sets the Switch to use Weighted Round Robin (WRR) methods to service queues. Weighted Round Robin services queues on a rotating basis based on their queue weight (the number you configure in the interface weight command, see Table 69 on page 111). Queues with larger weights get more service than queues with smaller weights.	C	13
`wrr <wt1> <wt2> ... <wt8>`	Sets the queue weighting for weighted round robin (WRR) and weighted fair scheduling (WFS) on the specified port(s). *wt1, wt2, ..., wt8*: 1~15	C	13

84.2 Command Examples

This example changes the console port baud rate to 115200 bps..

```
sysname# baud 5

Saving to ROM.  Please wait...
Change Console Speed to 115200. Then hit any key to continue
```

This example sends Ping requests to an Ethernet device with IP address `172.1.1.254`.

```
sysname# ping 172.1.1.254
Resolving 172.1.1.254... 172.1.1.254
      sent      rcvd  rate    rtt     avg    mdev     max     min
         1         1  100       0       0       0       0       0
         2         2  100       0       0       0       0       0
         3         3  100       0       0       0       0       0
```

The following table describes the labels in this screen.

Table 196 ping

LABEL	DESCRIPTION
sent	This field displays the sequence number of the ICMP request the Switch sent.
rcvd	This field displays the sequence number of the ICMP response the Switch received.
rate	This field displays the percentage of ICMP responses for ICMP requests.
rtt	This field displays the round trip time of the ping.
avg	This field displays the average round trip time to ping the specified IP address.
mdev	This field displays the standard deviation in the round trip time to ping the specified IP address.
max	This field displays the maximum round trip time to ping the specified IP address.
min	This field displays the minimum round trip time to ping the specified IP address.

This example shows the current status of the various alarms in the Switch.

```
sysname# show alarm-status
             name  status  suppressAlarm  alarmLED
-----------------  ------  -------------  --------
          VOLTAGE  Normal             No       Off
      TEMPERATURE  Normal             No       Off
              FAN  Normal             No       Off
    POE OVER LOAD  Normal            Yes       Off
POE SHORT CIRCUIT  Normal            Yes       Off
     POE POWERBOX  Normal            Yes       Off
```

The following table describes the labels in this screen.

Table 197 show alarm-status

LABEL	DESCRIPTION
name	This field displays the name or type of the alarm.
status	This field displays the status of the alarm. **Normal**: The alarm is off. **Error**: The alarm is on.
suppressAlarm	This field displays whether or not the alarm is inactive.
alarmLED	This field displays whether or not the LED for this alarm is on.

This example looks at the current sensor readings from various places in the hardware.

```
sysname# show hardware-monitor C

Temperature Unit : (C)
Temperature(%c)  Current     Max     Min  Threshold  Status
-------------------------------------------------------------
           VDSL    49.0    49.0    34.0       85.0   Normal
         Switch    39.0    39.0    32.0       85.0   Normal
        ADT7463    38.0    39.0    35.0       85.0   Normal

FAN Speed(RPM)  Current   Max   Min  Threshold  Status
-----------------------------------------------------
          FAN1     2748  4847  2667       1000  Normal
          FAN2     2708  4817  2666       1000  Normal
          FAN3     2789  4851  2645       1000  Normal

Voltage(V)  Current     Max     Min  Threshold  Status
-------------------------------------------------------
    2.5VIN   2.519    2.519   2.506       +-6%  Normal
    1.2VIN   1.271    1.271   1.271      +-10%  Normal
   3.3VAIN   3.394    3.394   3.394       +-6%  Normal
   3.3VBIN   3.398    3.398   3.372       +-6%  Normal
   12.0VIN  12.531   12.531  12.531      +-10%  Normal
```

The following table describes the labels in this screen.

Table 198 show hardware-monitor

LABEL	DESCRIPTION
Temperature Unit	This field displays the unit of measure for temperatures in this screen.
Temperature	This field displays the location of the temperature sensors.
Current	This field displays the current temperature at this sensor.
Max	This field displays the maximum temperature measured at this sensor.
Min	This field displays the minimum temperature measured at this sensor.
Threshold	This field displays the upper temperature limit at this sensor.
Status	`Normal:` The current temperature is below the threshold. `Error`: The current temperature is above the threshold.
FAN Speed(RPM)	This field displays the fans in the Switch. Each fan has a sensor that is capable of detecting and reporting when the fan speed falls below the threshold.

Table 198 show hardware-monitor (continued)

LABEL	DESCRIPTION
Current	This field displays the current speed of the fan at this sensor.
Max	This field displays the maximum speed of the fan measured at this sensor.
Min	This field displays the minimum speed of the fan measured at this sensor. It displays "<41" for speeds too small to measure. (See the User's Guide to find out what speeds are too small to measure in your Switch.)
Threshold	This field displays the minimum speed at which the fan should work.
Status	`Normal`: This fan is running above the minimum speed. `Error`: This fan is running below the minimum speed.
Voltage(V)	This field displays the various power supplies in the Switch. Each power supply has a sensor that is capable of detecting and reporting when the voltage is outside tolerance.
Current	This field displays the current voltage at this power supply.
Max	This field displays the maximum voltage measured at this power supply.
Min	This field displays the minimum voltage measured at this power supply.
Threshold	This field displays the percentage tolerance within which the Switch still works.
Status	`Normal`: The current voltage is within tolerance. `Error`: The current voltage is outside tolerance.

This example shows the ARP table.

```
sysname# show ip arp
received 127492 badtype 0 bogus addr 0 reqst in 25 replies 8 reqst out 22
bad VID 0
cache hit 101039 (61%), cache miss 63813 (38%)
IP-addr         Type           Time  Addr              stat iface channel
172.1.1.43      Ethernet       250   00:0f:fe:0a:2d:3b 41   swif0 swp24
172.1.1.33      Ethernet       170   00:0f:fe:ad:58:ab 41   swif0 swp24
172.1.1.202     Ethernet       10    00:00:aa:10:05:87 41   swif0 swp24
172.1.1.203     Ethernet       10    00:13:49:00:00:02 41   swif0 swp24
172.1.1.254     Ethernet       300   00:04:80:9b:78:00 41   swif0 swp24
172.1.1.255     Ethernet       0     ff:ff:ff:ff:ff:ff 43   NULL  NULL
num of arp entries= 6
```

The following table describes the labels in this screen.

Table 199 show ip arp

LABEL	DESCRIPTION
received	This field displays the number of ARP packets received by the Switch.
badtype	This field displays the number of ARP packets with an invalid type.
bogus addr	This field displays the number of ARP packets with invalid IP addresses.
reqst in	This field displays the number of ARP requests received by the Switch.
replies	This field displays the number of ARP responses to ARP requests sent by the Switch.
reqst out	This field displays the number of ARP requests sent by the Switch.
bad VID	This field displays the number of ARP requests with an invalid VLAN ID.

Table 199 show ip arp (continued)

LABEL	DESCRIPTION
cache hit	This field displays the number of times the Switch looked up an IP address in the ARP table and found an entry for it.
cache miss	This field displays the number of times the Switch looked up an IP address in the ARP table and did not find an entry for it.
IP-addr	This field displays the learned IP address of the device.
Type	This field displays the type of interface from which this ARP entry was learned.
Time	This field displays how long (in seconds) the entry remains valid. Zero means the entry is always valid.
Addr	This field displays the MAC address of the device.
stat	This field is reserved.
iface	This field is reserved.
channel	This field is reserved.
num of arp entries	This field displays the total number of ARP entries.

This example displays the system logs.

```
sysname# show logging
   0 Sun Jan  4 08:26:20 1970 PP0c  ERROR Port 18 link down
   1 Sun Jan  4 08:26:22 1970 PP0c -WARN  SNMP TRAP 3: port 18 link up
   2 Sun Jan  4 08:26:22 1970 PP0c  ERROR Port 18 link up
   3 Sun Jan  4 08:26:27 1970 PP0c -WARN  SNMP TRAP 2: port 18 link down
   4 Sun Jan  4 08:26:27 1970 PP0c  ERROR Port 18 link down
   5 Sun Jan  4 08:26:29 1970 PP0c -WARN  SNMP TRAP 3: port 18 link up
   6 Sun Jan  4 08:26:29 1970 PP0c  ERROR Port 18 link up
   7 Sun Jan  4 08:38:28 1970 PP0c -WARN  SNMP TRAP 2: port 18 link down
   8 Sun Jan  4 08:38:28 1970 PP0c  ERROR Port 18 link down
   9 Sun Jan  4 08:38:31 1970 PP20 -WARN  SNMP TRAP 26: Event On Trap
  10 Sun Jan  4 08:38:44 1970 PP0c -WARN  SNMP TRAP 3: port 18 link up
  11 Sun Jan  4 08:38:44 1970 PP0c  ERROR Port 18 link up
  12 Sun Jan  4 08:38:44 1970 PP20 -WARN  SNMP TRAP 27: Event Cleared Trap
  13 Sun Jan  4 08:40:58 1970 PP0c -WARN  SNMP TRAP 2: port 18 link down
  14 Sun Jan  4 08:40:58 1970 PP0c  ERROR Port 18 link down
  15 Sun Jan  4 08:41:01 1970 PP20 -WARN  SNMP TRAP 26: Event On Trap
  16 Sun Jan  4 08:46:37 1970 PSSV  WARN  Fan alarm clear
  17 Sun Jan  4 08:47:10 1970 PSSV  WARN  Fan alarm
  18 Sun Jan  4 09:22:40 1970 PSSV  WARN  Fan alarm clear
Clear Error Log (y/n):
```

This example shows the current multicast groups on the Switch.

```
sysname# show multicast
  Multicast Status

  Index   VID    Port   Multicast Group
  -----   ----   ----   ----------------
```

The following table describes the labels in this screen.

Table 200 show multicast

LABEL	DESCRIPTION
Index	This field displays an entry number for the VLAN.
VID	This field displays the multicast VLAN ID.
Port	This field displays the port number that belongs to the multicast group.
Multicast Group	This field displays the IP multicast group addresses.

This example shows the current multicast VLAN on the Switch.

```
sysname# show multicast vlan
  Multicast Vlan Status

  Index   VID    Type
  -----   ----   ----------
      1   3      MVR
```

The following table describes the labels in this screen.

Table 201 show multicast vlan

LABEL	DESCRIPTION
Index	This field displays an entry number for the multicast VLAN.
VID	This field displays the multicast VLAN ID.
Type	This field displays what type of multicast VLAN this is. `MVR`: This VLAN is a Multicast VLAN Registration (MVR). `Static`: This VLAN is configured via IGMP snooping VLAN in fixed mode. `Dynamic`: This VLAN is learned dynamically in auto mode. See Chapter 25 on page 101 for more information about IGMP snooping VLAN and IGMP modes.

This example looks at general system information about the Switch

```
sysname# show system-information

System Name             : VES-1616FA-54
System Contact          :
System Location         :
Ethernet Address        : 00:19:cb:00:00:02
ZyNOS F/W Version       : V3.50(AYG.2)b6 | 03/24/2008
RomRasSize              : 3592020
System up Time          :    74:28:48 (19921c8 ticks)
Bootbase Version        : V0.2 | 06/08/2007
Power info              : N/A
Product Model           : VES-1616FA-54
```

The following table describes the labels in this screen.

Table 202 show system-information

LABEL	DESCRIPTION
System Name	This field displays the system name (or hostname) of the Switch.
System Contact	This field displays the name of the person in charge of this Switch. Use the `snmp-server` command to configure this. See Chapter 60 on page 231.
System Location	This field displays the geographic location of this Switch. Use the `snmp-server` command to configure this. See Chapter 60 on page 231.
Ethernet Address	This field displays the MAC address of the Switch.
ZyNOS F/W Version	This field displays the firmware version the Switch is running.
RomRasSize	This field displays how much ROM is used.
System up Time	This field displays how long the switch has been running since it last started up.
Bootbase Version	This field displays the bootbase version the Switch is using.
Power Info	This field displays the power model (`AC`/`Dc`/`Dual`) on your Switch.
Product Model	This field displays the model name.

This example displays the firmware version the Switch is currently using..

```
sysname# show version
  Current ZyNOS version: V3.80(BPC.0)b4 | 04/02/2009
```

This example displays the firmware versions of the dual firmware images..

```
sysname# show version flash
  Flash 1 ZyNOS version : V3.80(BPC.0)b4 | 04/02/2009
  Flash 2 ZyNOS version : V3.80(BPC.0)b1 | 03/01/2009
```

This example displays route information to an Ethernet device with IP address `192.168.1.100`.

```
sysname> traceroute 192.168.1.100
traceroute to 192.168.1.100, 30 hops max, 40 byte packet
  1:192.168.1.100 (10 ms) (10 ms) (0 ms)
traceroute done:
sysname>
```

PART III
Appendices and Index

Default Values (329)
Legal Information (331)
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A

Default Values

Some commands, particularly no commands, reset settings to their default values. The following table identifies the default values for these settings.

Table 203 Default Values for Reset Commands

COMMAND	DEFAULT VALUE
`no https timeout`	300 seconds
`no ip inband`	IP address: 192.168.1.1 Subnet mask: 255.255.255.0
`no ip outband`	IP address: 192.168.0.1 Subnet mask: 255.255.255.0
`no radius-server`	IP address: 0.0.0.0 Port number: 1812 Key: blank

B

Legal Information

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This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operations.

FCC Warning

This device has been tested and found to comply with the limits for a Class A digital switch, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This device generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning:

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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這是甲類的資訊產品，在居住的環境使用時，
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使用者會被要求採取某些適當的對策.

Notices

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

CLASS 1 LASER PRODUCT

APPAREIL A LASER DE CLASS 1

PRODUCT COMPLIES WITH 21 CFR 1040.10 AND 1040.11.

PRODUIT CONFORME SELON 21 CFR 1040.10 ET 1040.11.

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1. Go to http://www.zyxel.com.
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Registration

Register your product online to receive e-mail notices of firmware upgrades and information at www.zyxel.com.

List of Commands (Alphabetical)

Use of undocumented commands or misconfiguration can damage the unit and possibly render it unusable.

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<d32|d48|d64|d128|b7-1 .. b7-10|b8-1 .. b8-16> 280
<*port-number*> 102
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001 132
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arp inspection filter-aging-time <1-2147483647> 39
arp inspection filter-aging-time none 39
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arp inspection log-buffer entries <0-1024> 40
arp inspection log-buffer logs <0-1024> interval <0-86400> 40
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bandwidth-limit egress <*rate*> 46
bandwidth-limit ingress <*rate*> 45
bandwidth-limit pir <*rate*> 46
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bitSwapDs <enable|disable> 279
bitSwapUs <enable|disable> 279
boot config 318
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bpdu-control <peer|tunnel|discard|network> 111
broadcast-limit 47
broadcast-limit <*pkt/s*> 47
cable-diagnostics <*port-list*> 318
CBS <256~512,000> 127
cfm debug <0:disable|1:enable> 50
cfm domain <*domain-name*> level <0~7> 50
cfm-action cc level <0~7> vlan <1~4094> 50
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